VHF MARINE RADIO

TKM-307

SERVICE MANUAL

KENWOOD

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B51-8093-00 (O) 745

Sleeve case (BLACK)
(A02-1514-08) : K,M,P,X
Sleeve case (WHITE)
(A02-1515-08) : K2,M2,P2,X2

Microphone (BLACK)
(T91-0395-08) : K,M,P,X
Microphone (WHITE)
(T91-0399-08) : K2,M2,P2,X2

Panel escutcheon (BLACK)
(A62-0040-08) : K,M,P,X
Panel escutcheon (WHITE)
(A62-0041-08) : K2,M2,P2,X2

Membrane sheet (BLACK)
(B03-0566-08) : K,M,P,X
Membrane sheet (WHITE)
(B03-0567-08) : K2,M2,P2,X2

CIRCUIT DESCRIPTION

Circuit Configuration by Frequency

The receiving system utilizes double-conversion techniques. That is, an incoming signal is mixed down to the 1st intermediate frequency (IF) of 21.6MHz, using a 1st local oscillator frequency of from 134.4 to 141.975MHz. The 1st IF signal is then mixed with the 2nd local oscillator frequency of 21.145MHz to generate the 2nd IF of 455kHz.

The transmitting system consists of a PLL circuit which allows direct modulation and direct frequency division. Signals from the PLL circuit are amplified by a linear amplifier for transmission.

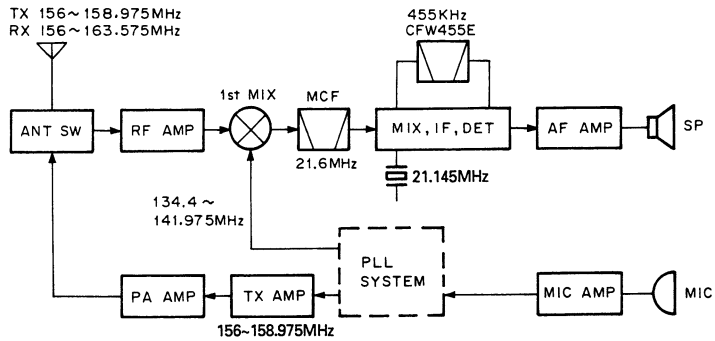


Fig. 1 Frequency configuration

Receiving System

- **Overview**

Incoming signals from the antenna pass through a low-pass filter in the final block of the transmitter system, and are switched to the front-end of the receiver system via the receive/transmit switching diode. The signals then pass through the antenna matching coil, where the high-frequency components are amplified by an N-channel MOS FET. The signals are then fed into a two-stage bandpass filter that uses varicap tuning to reject unwanted components, and are then fed to the first mixer.

The first mixer uses the N-channel MOS FET used in the RF stage to obtain better two-signal characteristics. The first mixer mixes the signal with the first local oscillator frequency and coverts it to the first IF (21.6 MHz). The signal then passes through two monolithic crystal filters (MCFs) to remove unnecessary near-by frequency components.

The signal from the MCFs is used as the first IF signal.

The first IF signal is amplified and fed into IC1 in the narrow-FM IC (MC3361P). The IF signal is then mixed with the second local oscillator frequency of 21.145 MHz to generate the second IF of 455kHz. The 455kHz signal then passes through a six-element ceramic filter (CFW455E), and is fed back into IC1 for additional amplification. (This signal is amplified by a limiter amplifier, and is detected by quadrature.) The detector output passes through the electronic volume controll driven by the microprocessor.

Unnecessary signal components are removed by active high-pass and active low-pass filters. The deteced signal is amplified by the power amplifier and is output from the speaker.

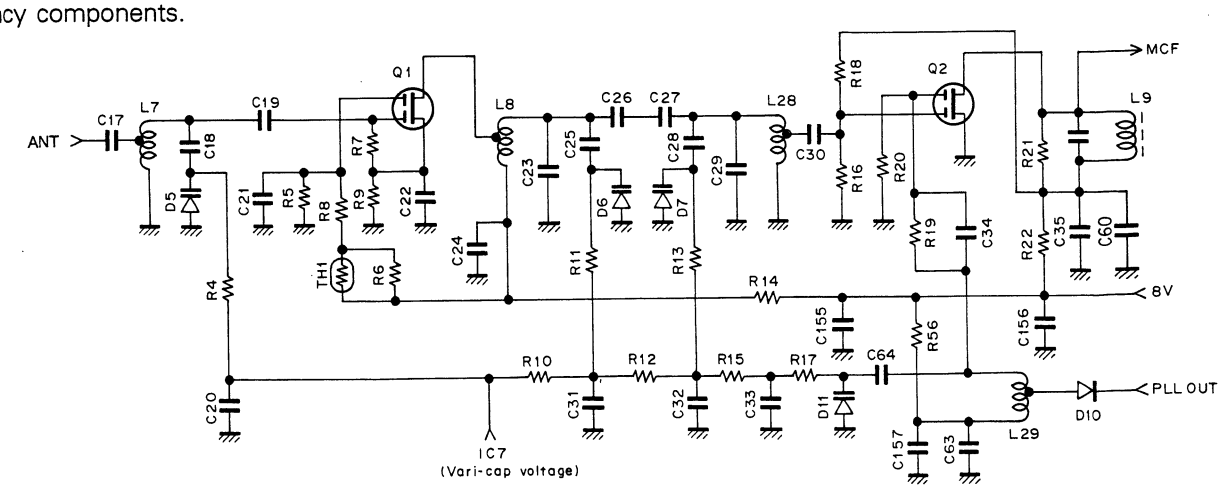


Fig. 2 Front-end section (vari-cap tuning)

CIRCUIT DESCRIPTION

- **Squelch circuit**

The noise component extracted from the detector output passes through the bandpass filter, removing the second IF component (455kHz) and audio component, and is amplified.

The noise then passes through the noise detector and active low-pass filter, and is the DC signal. The detected DC signal is fed into the hysteresis amplifier via the electronic squelch volume controll driven by the microprocessor, and is input to the microprocessor. The microprocessor determines whether to switch the squelch on or off with this signal.

Item	Rating
Nominal center frequency (fo)	21.6MHz
Pass bandwidth	±7.5kHz or more at 3dB
Attenuation bandwidth	±25kHz or less at 40dB
Ripple	1.0dB or less
Insertion loss	2.0dB or less
Guaranteed attenuation	65dB or more within fo +350kHz to +1MHz 80dB or more within fo −200kHz to −1MHz
Terminating impedance	1.5kΩ/1.0pF

Table 1 MCF (L71-0300-08) (TX-RX unit L10)

Item	Rating
Nominal center frequency (fo)	455kHz ± 1kHz
6dB bandwidth	±7.5kHz or more (from 455kHz)
50dB bandwidth	±15kHz or less (from 455kHz)
Ripple (within ±4kHz of 455kHz)	3.0dB or less
Insertion loss	6.0dB or less
Guaranteed attenuation (within ±100kHz of 455kHz)	35dB or more
I/O matching impedance	1.5kΩ

Table 2 Ceramic filter CFW455E (L72-0316-05) (TX-RX unit L18)

Electronic volume control circuit

- **Overview**

The audio volume control and squelch volume control allow the CPU to control the data, clock, and strobe for IC4 or TC9154AP in the TX-RX unit. The volume IC, TC9154AP, has two channels, so it uses the right channel for audio and the left channel for squelch.

Transmitting System

- **Overview**

The transmitter produces the target frequency thru the use of direct FM-modulation via a varactor diode.

- **Modulation circuit**

Audio signals from the microphone pass through the microphone amplifier. This microphone amplifier amplifies and adds preemphasis and limiting; it includes a splatter filter to remove undesired high-frequency components. The frequency modulation circuit directly modulates the VCO frequency with a varicap diode.

- **Younger stage circuit**

The output signal from the VCO enters the three-stage straight amplifier (Q12, Q11, Q10), which is capable of high-quality signal amplification because it operates entirely in the linear mode. The APC (Automatic Power control) circuit controls the gain by changing the voltage at the second gate of the N-channel dual-gate MOS FET (Q11) in the second stage.

- **Power amplification circuit**

The drive signal is input to the power module (IC2) and is amplified to the desired level.

- **APC and SWR protection circuits**

Figure 3 shows the basic APC (Automatic Power Control) and SWR (Standing Wave Ratio) protection circuits.

The SWR protection circuit incorporates a CM coupler that detects any reflected power caused by mismatching of the antenna. After detection and amplification, this circuit acts to lower the output control voltage, which protects the power module by reducing the gain.

The APC circuit incorporates a diode that is used to detect a portion of the output from the power module. The detected signal is amplified and is then used to control the power control voltage. The control voltage is inversely proportional to the output, so a constant output level is maintained.

- **TX display circuit**

Q6 in the TX-RX unit is switched by detecting the progressive wave from the transmit output, then pin 37 of the CPU is displayed by TX as the low level on the LCD.

CIRCUIT DESCRIPTION

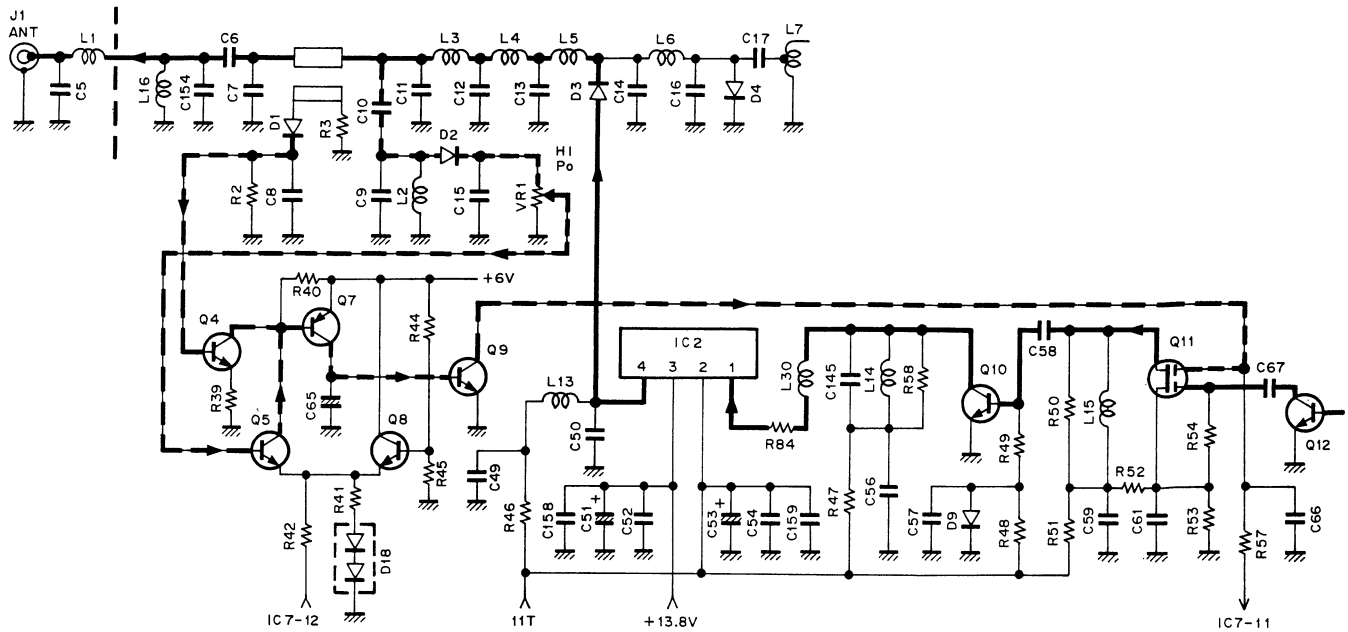


Fig. 3 Younger stage, Power amplification, APC protection, and SWR protection circuits

Item	Symbol	Tc (25°C)	Condition	Rating	Unit
Operating voltage	Vcc	25		17	V
Current consumption	Icc	25		7	A
Input power	Pin	25	Z_G = 50Ω	0.4	W
Output power	Po	25	Z_G = Z_L = 50Ω	40	W
Operating case temperature	Tc (op)			-30 ~ +110	°C
Storage temperature	Tstg			-40 ~ +110	°C

Table 3 Power module M57710-A maximum rating (TX-RX unit IC2)

PLL Synthesizer Unit

- **Overview**

Figure 4 is a the block diagram of the PLL. The PLL of TKM-307 consists of a reference oscillator (L26) using the PLL-IC (IC6) and the IC's internal oscillation circuit, a low-pass filter, and a VCO (Q18). The comparison frequency divides a reference oscillation frequency of 12.8MHz by 1/512 to obtain 25kHz.

The oscillation frequency of the transmit/receive VCO directly oscillates the desired frequency. The oscillation frequency is then input through a two-stage buffer amplifier (Q19, 13) to the pulse swallow-type PLL-IC, and is sent to the frequency divider and phase comparator to lock the frequency. The PLL-IC (MB87014A) can set the reference and comparison frequency division ratios according to external serial data. Two 1/64 and 1/65 modulus prescalers are incorporated in the PLL-IC to permit a one-chip pulse swallow-type PLL configuration.

CIRCUIT DESCRIPTION

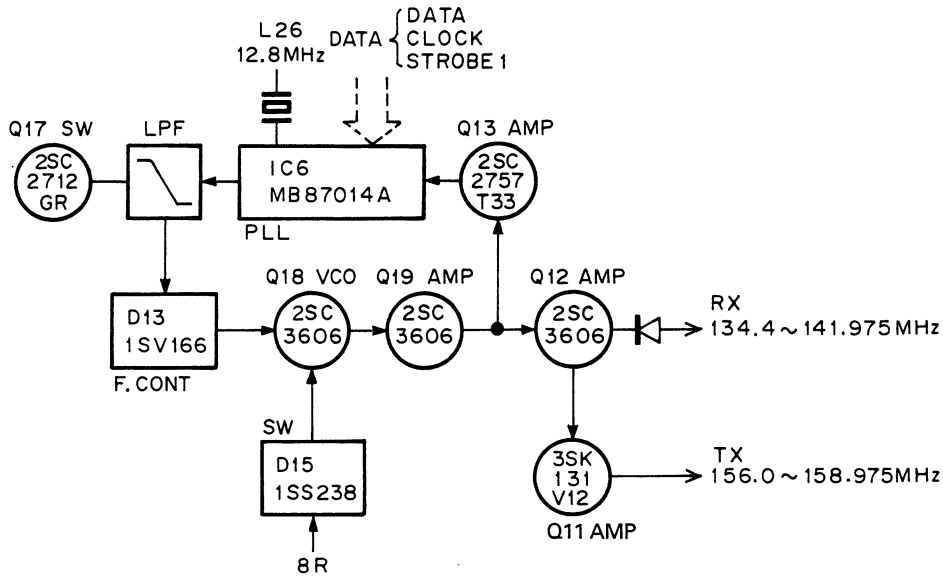


Fig. 4 PLL block diagram

- **Channel data**

The channel data is classified into reference data and comparison frequency division data. The reference data writes data when the power is switched on. The comparison frequency division data writes data during the power-on sequence, channel selection, and transmit/receive selection.

1) Reference data

Number of reference frequency divisions
= 12.8MHz/comparison frequency
= 12.8MHz/25kHz
= 512

LSB MSB

C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Notes :

- Symbol C indicates a control bit. It rewrites reference data when 1, and rewrites comparison frequency division data when 0.
- Data is sent MSB through LSB and control bit sequence.

2) Comparison frequency division data (for 16 channels)

Number of transmit frequency divisions
= 156.800MHz/25kHz
= 6272

LSB MSB

C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	0

Number of receive frequency divisions
= (156.800MHz – 21.6MHz)/25kHz
= 5408

LSB MSB

C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0

CIRCUIT DESCRIPTION

- **Unlock detector circuit**

When the PLL circuit is unlocked, the microprocessor reads when pin 7 of the PLL-IC (IC6) is low and controls IC7 (shift register). The microprocessor stops transmission output and so avoids unwanted emissions by decreasing Q11 (G2) to 0V.

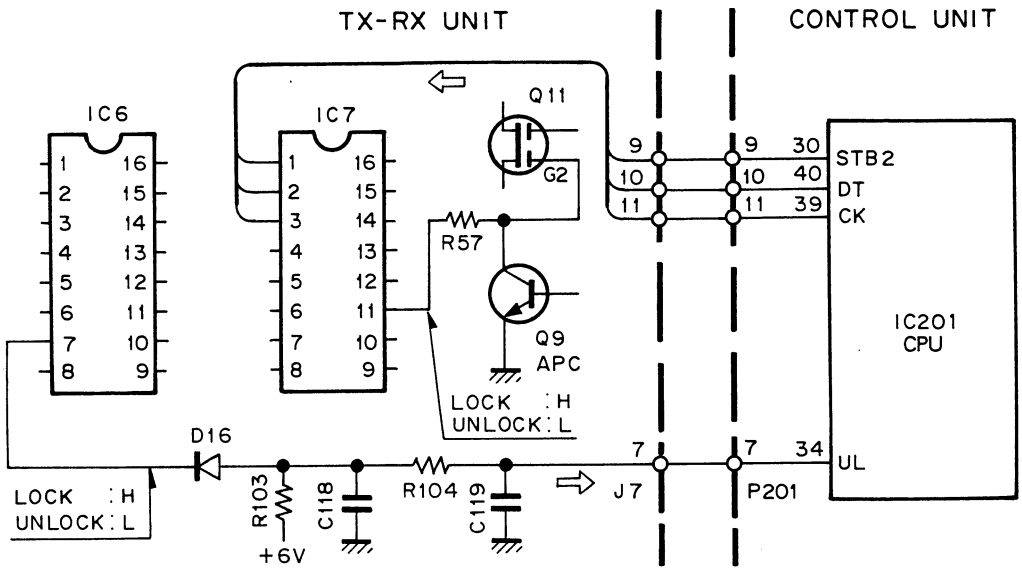


Fig. 5 Unlock detector circuit

Digital Control Block

- **Overview**

The digital control block consists of a micrprocessor (IC201, CPU) in the control unit, input keys, a display indicator, a reset circuit, peripheral circuitry, a shift register in the TX-RX unit (eight-stage shift/store bus register), and an electronic volumd control. It can control various functions with one CPU. Table 4 lists the pin functions of the CPU.

- **Key, other digital input circuits**

Figure 6 shows the input circuit. The key switch data is directly input to the CPU. The external PTT and ON-HOOK terminals have a transistor buffer that protects the CPU and that is activated when the terminal is connected to the ground.

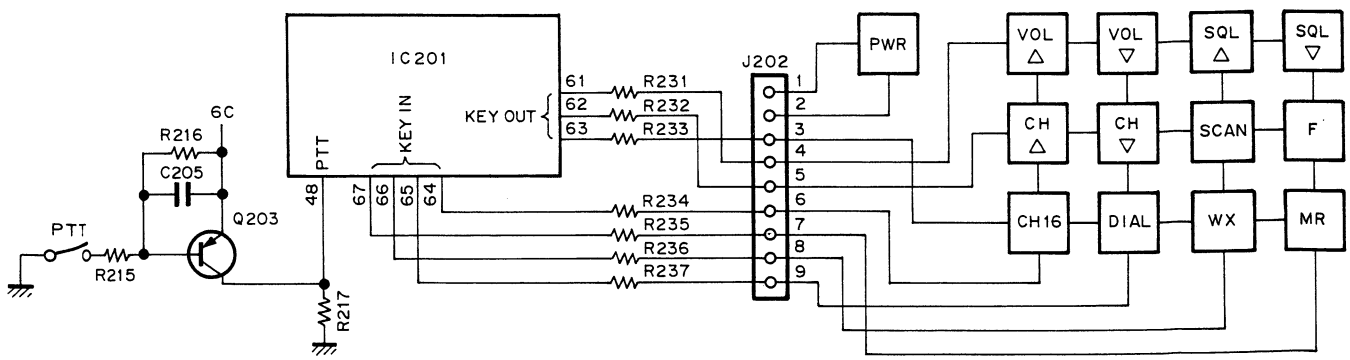
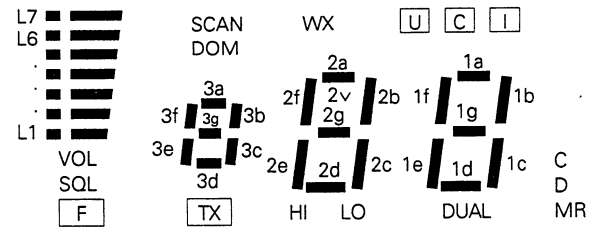


Fig. 6 Key, other digital input circuits

CIRCUIT DESCRIPTION

Port label	Port name	Pin	I/O	Stop	Signal detail
LCD segment port	S31~S26	20~15	–	L	Not use
	S25, S24	14,13	O	L	S25 S24 2^0 L7 L5 2^1 L6
LCD segment port	S23~S12	12~1	O	L	S23 S22 S21 S20 S19 S18 S17 S16 S15 S14 S13 S12 2^0 L3 L1 VOL [TX] 3e 3c 3b 3a HI 2E 2c 2b 2^1 L4 L2 SQL [F] 3d 3g 3f LO 2v 2d 2g
LCD segment port	S11~S0	80~69	O	L	S11 S10 S9 S8 S7 S6 S5 S4 S3 S2 S1 S0 2^0 2a MR C 1e 1c 1b 1a [I] [U] WX DOM 2^1 2f DUAL D 1d 1g 1f [C] SCAN 
LCD common port	COM0,COM1	21,22	O	L	Common output port
	COM2,COM3	23,24	–	L	Not use
LCD bias port	BIAS	25	O	OFF	LCD bias (5V)
	VLC0	26	I	OFF	LCD drive voltage port (5V)
	VLC1,VLC2	27,28	I	OFF	LCD drive voltage port (Bias/2V)
Port 4	STB1	29	O	L	Data strobe PLL IC Enable "H"
	STB2	30	O	L	Data strobe Latch/electronic volume IC Enable "H"
	STB3	31	O	L	Data strobe Enable "H"
	BZ	32	O	L	Buzzer tone output
Port 5	UL	34	I	L	PLL lock detection 0 : Unlock 1 : Lock
	ON HOOK	35	I	L	HOOK switch 0 : OFF hook 1 : ON hook
	VERS.E	36	I	L	0 : OFF 1 : ON
	P.M	37	I	L	Carrier detection 0 : ON "TX" 1 : OFF
Port 0	ON/OFF	38	I	I	Power switch 0→1→0 : ON/OFF (1st→ON/2nd→OFF)
	CK	39	#O	*I	Serial data clock
	DT	40	#O	*I	Serial data
	VER.F	41	#I	*I	Select F 0 : Mobile 1 : Base
Port 1	VERS.A	42	#I	*I	DOM select A, EXP1/NORMO ABCD ABCD
	VERS.B	43	#I	*I	DOM select B EEXP : 1111 CANADA : X100
	VERS.C	44	#I	*I	DOM select C USA : X000 AUSTRALIA : X010
	VERS.D	45	#I	*I	DOM select D
Port 2	V1	46	*I	*I	External power supply 0 : Ext. power OFF 1 : Ext. power ON
	V2	47	*I	*I	Internal power supply 0 : Int. power OFF 1 : Int. power ON
	PTT	48	*I	*I	PTT input 0 : PTT OFF 1 : PTT ON
	SQL	49	*I	*I	Noise squelch 0 : Mute 1 : Unmute
Port 3	VC	50	#O	*L	Power CNTL 0 : Power OFF 1 : Power ON
	LAMP	51	#O	*H	LAMP 0 0 : High 1 : Low 1 : OFF
	LAMP	52	#O	*H	LAMP 1 0 : High 0 : Low 1 : OFF
	16CH	53	#O	*L	TX 16CH select 0 : Select OFF 1 : Select ON
Port 6	DET	60	#I	*L	0 : Det ON 1 : Det OFF
	KEYOUT 1	61	#O	*L	VOL▲ VOL▼ SQL▲ SQL▼
	KEYOUT 2	62	#O	*L	CH▲ CH▼ SCAN F
	KEYOUT 3	63	#O	*L	CH16 DIAL WX MR
Port 7	KEYIN 4	64	#I	*L	
	KEYIN 5	65	#I	*L	
	KEYIN 6	66	#I	*L	
	KEYIN 7	67	#I	*L	

: Internal resistor on (pull up) * : Internal resistor off

Table 4 Microprocessor : 75308GF-690-3B9 terminal function (Control unit IC201)

CIRCUIT DESCRIPTION

- **Backup circuit**

The TKM-307 has a two-stage backup function. If the unit is not connected to the external power supply (the DC cord is not connected to the power), a lithium battery backs up pins 54 and 55 of the CPU (IC201) by D203. If the unit is conected to the external power supply, the stabilized power supply of Q206 backs up the unit through D202.

- **Reset circuit**

Reset pulses genrate the voltage of Figure 7 at the collector of Q205 by the hysteresis amplifier (Q204 and Q205) when the external power supply is connected to the unit.

Q207 generates reset pulses by deriving the rising pulses of Q205. Reading the voltage of Q205 by pin 46 (V1) of the CPU (IC201) determines whether the external power supply is connected or not.

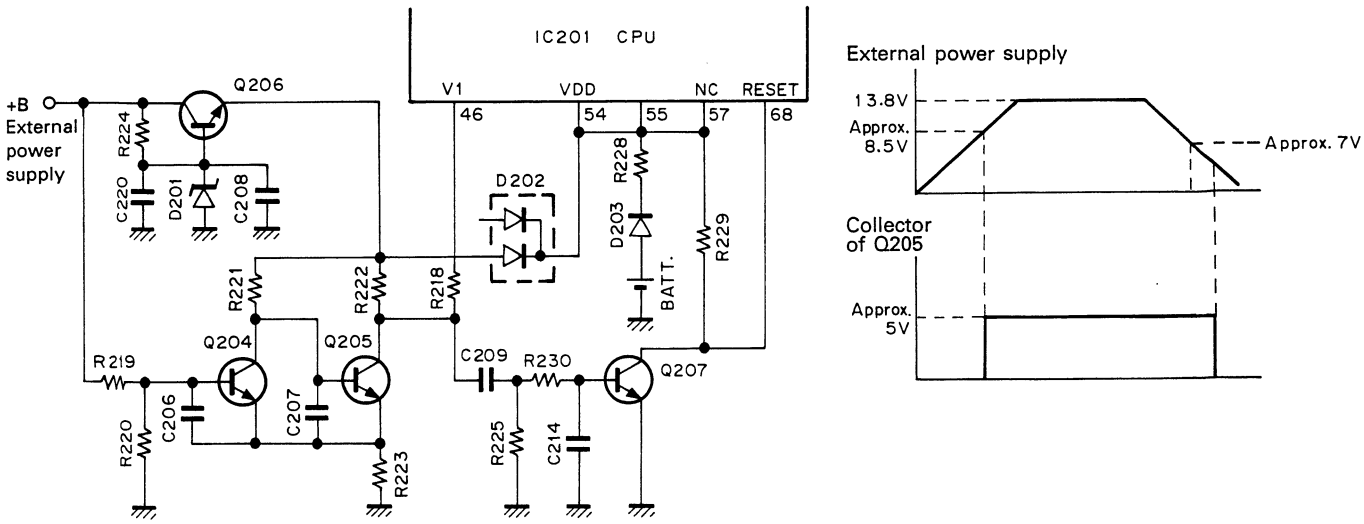


Fig. 7 Reset and backup circuits

- **Power switch**

The power switch makes pin 38 of the CPU high when the POWER switch on the panel is on. If voltage detection 1 (pin 46 of the CPU) is high, the power switch makes the VC (pin 50 of the CPU) high, turns on Q16 and 14 in the TX-RX unit, and supplies power to the main unit. If voltage detection 1 is off, the power switch makes the VC low, turns off Q16 and 14, and cuts the power to the main unit.

- **Lamp circuit**

When the outputs at pins 51 and 52 of the CPU are digital-to-analog converted and the current is amplified by Q201, the lamp brightness changes.

- **Shift register circuit**

The shift register converts the CPU serial data into parallel data. This data contains transmit/receive, and electronic tuning voltage signals.

Figure 8 shows the data transfer format of the shift register (μPD4094BG).

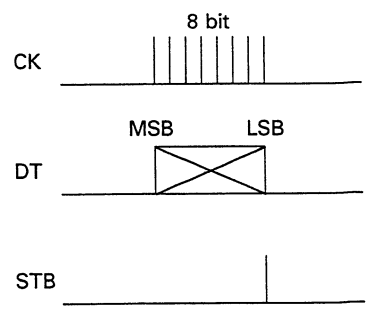


Fig. 8

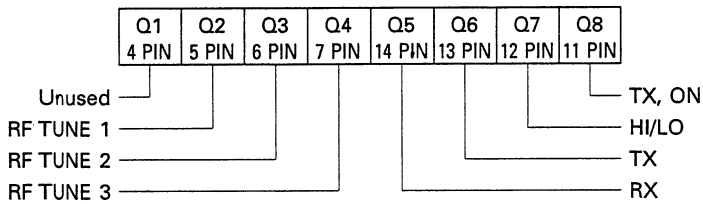
CIRCUIT DESCRIPTION

1) STB1 (Strobe 1)

STB1 sends the shift register data in a PLL-IC to the reference oscillation frequency and comparison frequency sides. Since the data was previously described in the item concerning the PLL, its explanation is omitted here.

2) STB2 (Strobe 2)

STB2 is a strobe signal of IC7. The pin functions of IC7 are as follows :



Q1 : Unused
Q2,3,4 : Digital/analog data applied to RF tuning.
Q5 : RX power supply on/off switch. High during receive.
Q6 : TX power supply on/off switch. High during transmit.
Q7 : Transmit power control. High power when high. Low power when low.
Q8 : High when the PLL is locked. Low when the PLL is unlocked.

RF tuning D/A data

freq'	155MHz region	156MHz region	157MHz region	158MHz region	159MHz region	160MHz region	161MHz region	162MHz region
Q2	L	L	L	L	H	H	H	H
Q3	L	L	H	H	L	L	H	H
Q4	L	H	L	H	L	H	L	H

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DESCRIPTION OF COMPONENTS

TX-RX UNIT (W02-1624-08)

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q1	High-frequency amplification	Operation for receive
Q2	First mixer	Converts received frequency to 21.6MHz.
Q3	IF amplification	Amplifies the first IF to 21.6MHz.
Q4	APC amplifier	Controls Q7 by reflection wave.
Q5	APC amplifier	Controls Q7 by forward wave.
Q6	Transmit power detection	Forward wave detection, switching
Q7, 9	APC amplifier	Controls Q11 (G2) by Q4, 5 control and adjusts the output power.
Q8	Low-power control	Adjusts Q7 bias by IC7 (12).
Q10	Transmit driver (power amplification)	Upgrade to the specific input of power module (IC12).
Q11	Buffer amplification	Amplifies the output of Q12 to the specific input of Q10.
Q12	First local oscillator frequency amplification	Amplifies the first local oscillator signal to the specific input of mixer. Upgrade to the specific input of Q11.
Q13	Buffer amplification	Amplifies the output of Q19 to the specific input of IC6 (PLL IC).
Q14, 16	+B switch	Switches the main power supply to 13.8V by microprocessor control VC.
Q17	LPF switching	Changes the constant of PLL LPF by 11T.
Q18	VCO	Operates as PLL VCO during transmit and receive.
Q19	Buffer amplification	Amplifies up to the specific input of Q12 and Q13.
Q20	11T AVR	Operates as 11V AVR during transmit.
Q21	8R AVR	Operates as 8V AVR during receive.
Q22	Microphone amplifier	Amplifies the signal from the microphone and performs preemphasis.
IC1 (1/2)	LPF	1 : Output 3 : Input
IC1 (2/2)	HPF	5 : Input 7 : Output
IC2	Power amplification	Power amplification to rated output.
IC3	Second local oscillator frequency, Mixer IF amplification, Detection Filter amplifier AF amplifier	16 : 1st IF signal input. 9 : Detection output. 11 : Filter amplifier output 14 : Squelch detection
IC4	Electronic volume control	Input 5 → 6 – 3 → 2 output : squelch control Input 12 → 11 – 14 → 15 output : volume control
IC5	6V AVR	
IC6	PLL	Pulse swallow-type PLL configuration.
IC7	Shift register	Receives BPF, TX, RX and transmits high or low.
IC8	AF amplification	Amplifies the receive modulation signal.
IC9	11T AVR	Operates as 11V AVR during transmit.
IC10	8R AVR	Operates as 8V AVR during receive.
IC11	Limit amplification	6 : Input 1 : Output HPF, IDC configuration.
D1	APC detection	Detects the reflection wave.
D2	APC detection	Detects the forward wave.
D3, 4	Transmit/receive switching	On during transmit.
D5 ~ 7	For receive BPF tuning	Vari-cap.
D8	Noise detection	
D9	For compensation	Compensates for the temperature of Q10 (driver).
D10	For low signal switch	On during receive.
D11	For first low tuning	Vari-cap.
D12	For protection	For protection of power supply reverse connection.
D13	Transmit/receive frequency control varactor	
D14	Transmit tuning varactor	Modulates VCO during TX.
D15	Switch	On when the VCO oscillation coil is switched and is transmitted.
D16	PLL unlock detection	
D17	For discharge	For forced discharge of IC7 shift register output enable terminal.
D18	For compensation	For compensation for APC temperature.

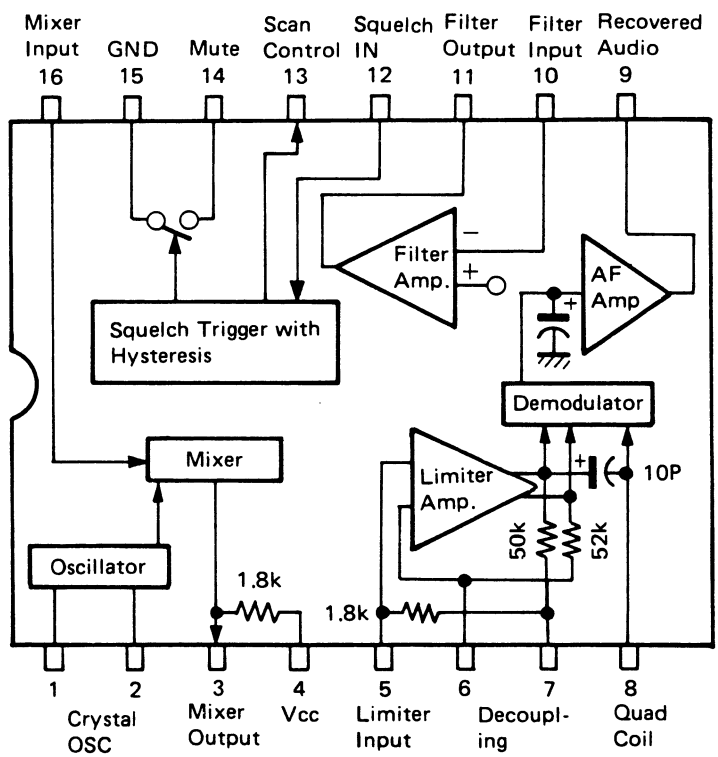
DESCRIPTION OF COMPONENTS/SEMICONDUCTOR DATA

CONTROL UNIT (W02-16XX-08) 1625 : K,K2,M,M2 1651 : P,P2 1652 : X,X2

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q201	Lighting control	Three-stage switching by 2-bit data from microprocessor.
Q202	Switch	On during on-hook.
Q203	Switch	On during transmit (during PTT SW on).
Q204,205,207	System reset	Detects reset output and reduced voltage.
Q206	5V AVR	
IC201	Microprocessor	Entire control such as frequency control or LCD display.
D201	5V AVR	
D202	Counter flow protection	Prevents the backup current from flowing in unwanted position.
D203	Counter flow protection	Prevents counter flow to the backup battery.

IF System : MC3361P (TX-TX unit IC3)

- **Block diagram**



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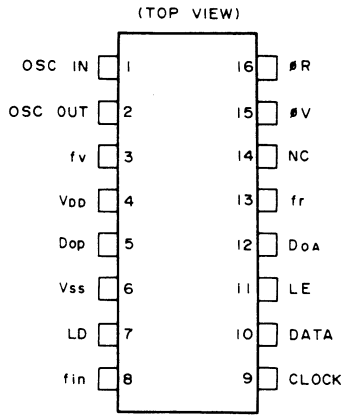
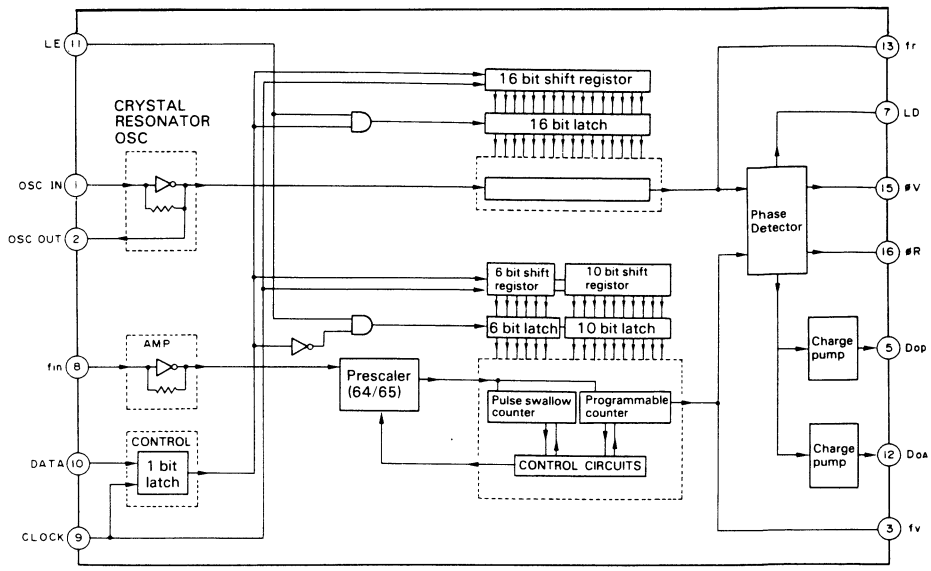
SEMICONDUCTOR DATA

PLL : MB87014A (TX-RX unit IC6)

- **Terminal connection diagram**



- **Block diagram**



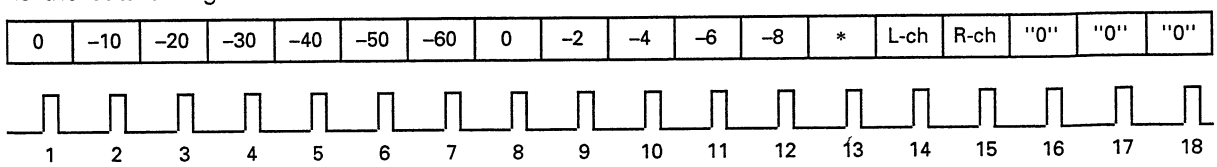
- **Terminal function**

Pin No.	Pin name	I/O	Function
1	OSC_{IN}	I	Crystal oscillator and capacitor connection pins. An external clock can be input to the OSC_{IN} pin. (OSC_{IN}: Oscillator input pin; OSC_{OUT}: Oscillator output pin)
2	OSC_{OUT}	O	
3	fv	O	A monitor pin for phase comparator input This signal corresponds to the relational divider output.
4	V_{DD}	—	A power pin
5	D_{OP}	O	A low-pass filter connection pin (passive). Reference divider output fr and relational divider output fv are in the following relation: o fr>fv: Drive mode (D_{OP}: High level) o fr=fv: High impedance o fr<fv: Sink mode (D_{OP}: Low level)
6	Vss	—	A ground pin
7	LD	O	A phase compsrator output pin. The high level pulse is output in the locked mode. The negative pulse is output in the unlocked mode.
8	fin	I	A prescaler input pin. Input a signal through AC coupling.
9	Clock	I	A shift register clock input pin. The data is read at the leading edge of a clock pulse.
10	Data	I	A shift register serial data input pin. The last bit of data is a control bit. For details, see the section "Functions".
11	LE	I	A load enable signal input pin. When LE is high, this signal, in combination with the control bit of data, sends the data in the shift register to the latch on the reference or comparison side.
12	D_{OA}	O	A low-pass filter connection pin (active). Reference divider output fr and relational divider output fv are in the following relation: o fr>fv: Sink mode (D_{OA}: Low level) o fr=fv: High impedance o fr<fv: Drive mode (D_{OD}: High level)
13	fr	O	A monitor pin for phase comparator input This signal corresponds to the reference divider output.
14	NC	—	An unused pin
15	ϕV	O	A low-pass filter connection pin (differential filter). Reference divider output fr and relational divider output fv are in the following relation: o fr>fv: ϕV=High level, ϕR=Low level o fr=fv: ϕV=High level, ϕR=High level o fr<fv: ϕV=Low level, ϕR=High level
16	ϕR	O	

SEMICONDUCTOR DATA

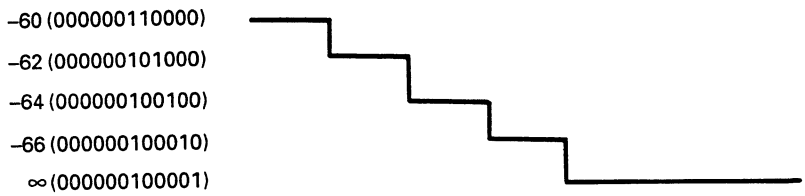
Electronic Volume Control : TC9154AP (TX-RX unit IC4)

The TC9154AP inputs any amount of damping data from terminals DATA, CK, and ST. Data contains 18 bits and the data configuration is as follows.



If 000100001000011000 is input by CK from the DATA terminal, the damping is –32 dB.

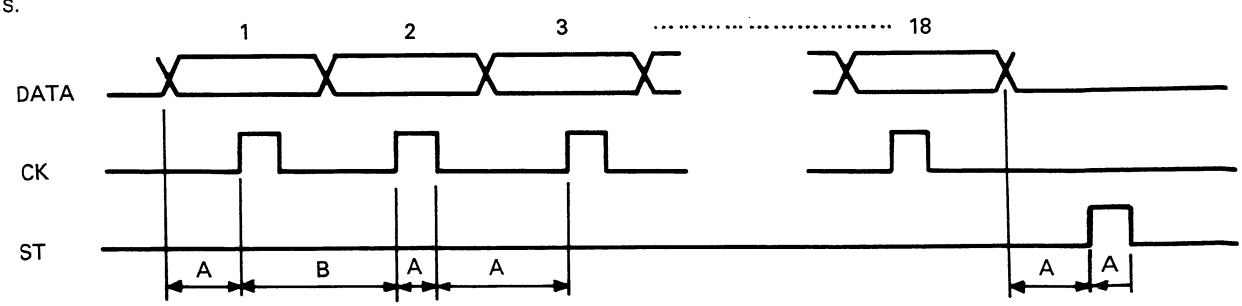
Data bits 1 to 7 are set to 10 dB/step and 8 to 12 are set to 2 dB/step. Bit 13 can be set to 1 or 0. Bits 14 and 15 select the right or left channel. If the bits are 1 and 0, the left channel is selected. If they are 0 and 1, the right channel is selected. If they are both 1, the right and left channels are selected. Bits 16 to 18 are fixed at 0. Infinite damping is done by –68dB data. When one step is increased to infinity, the damping is –66 dB.



All changes to fetched data are synchronized with the ST signal.

DATA, CK, ST timing

Input DATA, CK, and ST under the following conditions.



A > 5µsec
B < 10µsec

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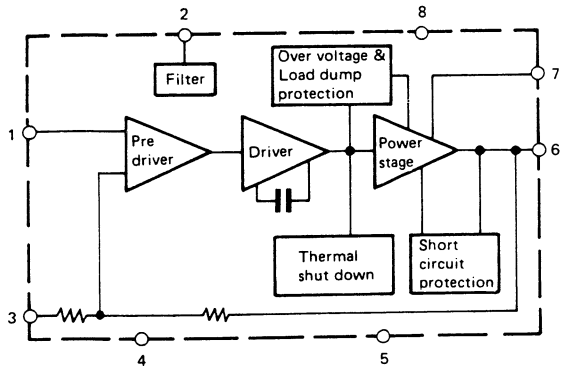
SEMICONDUCTOR DATA

AF Amplification : μPC1242H (TX-RX unit IC8)

- **Block diagram**



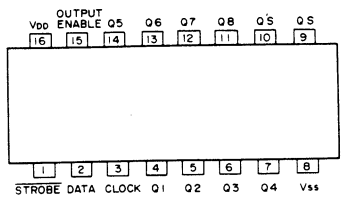
1 : Input
2 : Ripple filter
3 : N.F.B.
4 : GND
5 : GND
6 : Output
7 : Bootstrap
8 : Vcc

- **Electrical characteristics** Ta = 25°C, Vcc = 13.2V, f = 1kHz, R_L = 4Ω

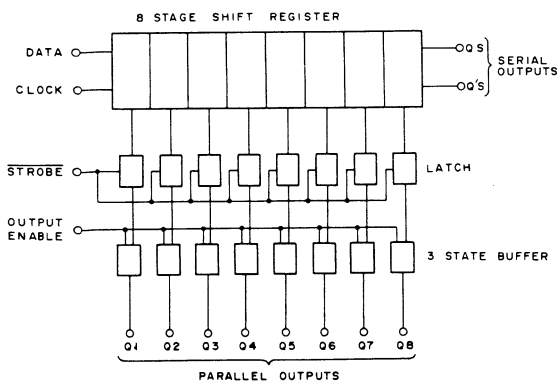
Item	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
DC current	Icc	vin = 0	25	45	80	mA
Output power	Po	T.H.D. = 10%	5.0	5.8	–	W
		R_L = 2Ω, T.H.D. = 10%	–	9.2	–	W
Distortion	T.H.D.	Po = 0.5W	–	0.1	1.0	%
		R_L = 2Ω, Po = 1W	–	0.4	–	%
Max. output power	POM		–	9.5	–	W
Voltage gain	Av	Po = 0.5W	49	51.5	54	dB
Noise output voltage	vn	R_G = 10kΩ	–	1.4	4.0	mVrms

Shift Register : μPD4094BG (TX-RX unit IC7)

- **Terminal connection diagram**



- **Block diagram**



- **Function table**

CLOCK	$\overline{\text{OUT PUT ENABLE}}$	$\overline{\text{STROBE}}$	DATA	Parallel outputs		Serial outputs	
				Q_1	Q_N	Q_S	Q_S'
⌜	L	X	X	High Impedance	High Impedance	Q_7	NO CHANGE
⌞	L	X	X	High Impedance	High Impedance	NO CHANGE	Q_7
⌜	H	L	X	NO CHANGE	NO CHANGE	Q_7	NO CHANGE
⌜	H	H	L	L	QN-1	Q_7	NO CHANGE
⌜	H	H	H	H	QN-1	Q_7	NO CHANGE
⌞	H	H	H	NO CHANGE	NO CHANGE	NO CHANGE	Q_7

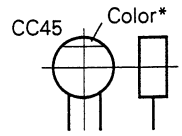
H: High level
L: Low level
X: High or Low level

PARTS LIST

CAPACITORS

CC 45 TH 1H 220 J
1 2 3 4 5 6

1 = Type ... ceramic, electrolytic, etc.
2 = Shape ... round, square, ect.
3 = Temp. coefficient
4 = Voltage rating
5 = Value
6 = Tolerance



• Capacitor value

010 = 1pF
100 = 10pF
101 = 100pF
102 = 1000pF = 0.001μF
103 = 0.01μF

2 2 0 = 22pF
0 = Multiplier
2 = 2nd number
2 = 1st number

• Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example : CC45TH = -470 ± 60ppm/°C

• Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 -20	+80 -20	+100 -0	More than 10μF - 10 ~ +50 Less than 4.7μF -10 ~ +75

Less than 10pF

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

• Voltage rating

1st word \ 2nd word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

• Chip capacitors

(EX) C C 7 3 F S L 1 H 0 0 0 J → Refer to the table above.
1 2 3 4 5 6 7
(Chip) (CH, RH, UJ, SL)

(EX) C K 7 3 F F 1 H 0 0 0 Z
1 2 3 4 5 6 7
(Chip) (B, F)

Dimension

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

RESISTORS

• Chip resistor (Carbon)

(EX) R D 7 3 E B 2 B 0 0 0 J
1 2 3 4 5 6 7
(Chip) (B,F)

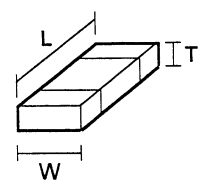
Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
2A	1/10W	2E	1/4W	3A	1W
2B	1/8W	2H	1/2W	3D	2W
2C	1/6W				

• Carbon resistor (Normal type)

(EX) R D 1 4 B B 2 C 0 0 0 J
1 2 3 4 5 6 7

Dimension



1 = Type ... ceramic, electrolytic, etc.
2 = Shape ... round, square, ect.
3 = Dimension
4 = Temp. coefficient
5 = Voltage rating
6 = Value
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			TKM-307			
1	2C	*	A02-1514-08	SLEEVE CASE (BLACK)	KMPX	
1	2C	*	A02-1515-08	SLEEVE CASE (WHITE)	K2M2	
1	2C	*	A02-1515-08	SLEEVE CASE (WHITE)	P2X2	
2	2A	*	A13-0692-08	SUB PANEL		
3	1A	*	A13-0693-08	SIDE PLATE (R)		
4	2B	*	A13-0694-08	SIDE PLATE (L)		
5	-		B42-3394-04	LABEL	KK2	
6	2D	*	A62-0040-08	PANEL ESCUTCHEON (BLACK)	KMPX	
6	2D	*	A62-0041-08	PANEL ESCUTCHEON (WHITE)	K2M2	
6	2D	*	A62-0041-08	PANEL ESCUTCHEON (WHITE)	P2X2	
8	2D	*	B03-0566-08	MEMBRANE SHEET (BLACK)	KMPX	
8	2D	*	B03-0567-08	MEMBRANE SHEET (WHITE)	K2M2	
8	2D	*	B03-0567-08	MEMBRANE SHEET (WHITE)	P2X2	
9	1E	*	B10-1158-08	LCD LENS		
10	-		B46-0420-10	WARRANTY CARD	KK2	
11	-	*	B62-0039-08	INSTRUCTION MANUAL		
12	1B	*	B72-0058-08	FCC PLATE	KK2	
12	1B	*	B72-0059-08	FCC PLATE	PP2	
12	1B	*	B72-0061-08	FCC PLATE	XX2	
15	1B		E23-0643-08	TERMINAL		
16	1B	*	E30-3029-08	DC CORD ASSY		
-		*	E37-0035-08	CONNECTING WIRE (2P)		
-		*	E37-0057-08	CONNECTING WIRE (3P)		
-		*	E37-0140-08	CONNECTING WIRE (4P)		
J1	1C		E04-0167-05	VHF RECEPTACLE (M)		
J8	1B		E11-0441-08	SP JACK		
20	1B	*	F01-0980-08	HEAT SINK		
21	-		F05-7025-05	FUSE (7A)		
22	1B	*	F10-1462-08	SHILDING COVER (POWER MODULE)		
23	2A	*	F29-0444-08	INSULATING WASHER		
25	1D		G10-0674-08	FELT (SP)		
26	1D		G53-0543-08	SP RUBBER		
27	2C	*	G53-0701-08	PACKING (REAR)		
28	1C	*	G53-0702-08	PACKING (FRONT)		
29	1B	*	G53-0703-08	CAP (EXT.SP)		
31	-	*	H10-2703-08	POLYSTYRENE FOAMED FIXTURE		
32	-	*	H11-0841-08	POLYSTYRENE PLATE		
33	-	*	H13-0845-08	PROTECTION PLATE		
34	-		H25-0060-03	PROTECTION BAG (210X400)		
35	-		H25-0096-04	PROTECTION BAG (70X130)		
36	-	*	H52-0033-08	ITEM CARTON BOX		
40	1B		J11-0413-08	CORD CLAMP		
41	1D	*	J21-4318-08	MOUNTING HARDWARE (SP)		
42	-		J29-0432-05	MIC HOOK KIT		
43	-	*	J29-0457-08	BRACKET (BLACK)	KMPX	
43	-	*	J29-0458-08	BRACKET (WHITE)	K2M2	
43	-	*	J29-0458-08	BLACKET (WHITE)	P2X2	
A	-	*	N08-0523-08	BOLT (BLACK)		
B	-	*	N08-0524-08	BOLT (WHITE)		
C	2A1B		N09-0256-05	MACHINE SCREW (M2.6X14)		
D	1B		N09-0626-04	SEMUS (MACHINE SCREW M3X10)		

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TX-RX UNIT (W02-1624-08)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
E	-		N09-2039-05	SEMUS (MACHINE SCREW M5X16)		
F	-		N09-2047-08	HEXAGON BOLT M5X20		
G	1C	*	N09-2136-08	SEMUS M3X8		
H	-	*	N09-2142-08	SEMUS M5X14		
45	2A		N10-3020-41	NUT M3		
46	-		N14-0539-08	NUT M5		
47	-		N15-1050-60	FLAT WASHER 5		
48	2A		N15-3010-41	FLAT WASHER 3		
49	-		N16-1050-60	SPRING WASHER 5		
J	1B		N30-2605-41	PAN HEAD MACHINE SCREW		
K	2A		N30-3008-41	PAN HEAD MACHINE SCREW		
L	2A2B		N35-2606-41	BINDING HEAD MACHINE SCREW		
M	1B		N35-3005-41	BINDING HEAD MACHINE SCREW		
N	1A2B		N85-2606-41	THIRD FLAT HEAD TAP TIGHT SCRE		
O	2E		N87-2004-41	SECOND BRAZIER TAP TIGHT SCREW		
P	1E1F		N87-2605-41	SECOND BRAZIER TAP TIGHT SCREW		
50	-	*	N99-0350-08	BOLT SET (BLACK)	KMPX	
50	-	*	N99-0351-08	BOLT SET (WHITE)	K2M2	
50	-	*	N99-0351-08	BOLT SET (WHITE)	P2X2	
51	-	*	N99-0354-08	SCREW SET		
55	1D		T07-0246-08	SPEAKER		
56	1C	*	T91-0395-08	MICROPHONE (BLACK)	KMPX	
56	1C	*	T91-0399-08	MICROPHONE (WHITE)	K2M2	
56	1C	*	T91-0399-08	MICROPHONE (WHITE)	P2X2	
57	2B	*	W02-1624-08	TX,RX UNIT		
58	1F	*	W02-1625-08	CONTROL UNIT	KMK2M2	
58	1F	*	W02-1651-08	CONTROL UNIT	PP2	
58	1F	*	W02-1652-08	COMTROL UNIT	XX2	
59	2E	*	W02-1663-08	SWITCH ASSY		
TX-RX UNIT (W02-1624-08)						
C5			CC45CH2H120J	CERAMIC 12PF J		
C6			CK73FB1H102K	CHIP C 1000PF K		
C7			CC73FCH1H100D	CHIP C 10PF D		
C8			CC73FCH1H101J	CHIP C 100PF J		
C9 ,10			CC73FCH1H010C	CHIP C 1PF C		
C11			CC73FCH1H220J	CHIP C 22PF J		
C12			CC73FCH1H330J	CHIP C 33PF J		
C13			CC73FCH1H220J	CHIP C 22PF J		
C14			CC73FCH1H150J	CHIP C 15PF J		
C15			CC73FCH1H101J	CHIP C 100PF J		
C16			CC73FCH1H070D	CHIP C 7PF D		
C17			CC73FCH1H090D	CHIP C 9PF D		
C18			CC73FCH1H080D	CHIP C 8PF D		
C19			CC73FCH1H030C	CHIP C 3PF C		
C20			CK73FB1H222K	CHIP C 2200PF K		
C21			CK73FB1H103K	CHIP C 0.010UF K		
C22			CK73FB1H222K	CHIP C 2200PF K		
C23			CC73FCH1H020C	CHIP C 2.0PF C		
C24			CK73FB1H222K	CHIP C 2200PF K		
C25			CC73FCH1H080D	CHIP C 8PF D		
C26 ,27			CC73FCH1H0R5C	CHIP C 0.5PF C		
C28			CC73FCH1H080D	CHIP C 8PF D		
C29			CC73FCH1H020C	CHIP C 2.0PF C		
C30			CC73FCH1H080D	CHIP C 8PF D		
C31 -33			CK73FB1H222K	CHIP C 2200PF K		

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TX-RX UNIT (W02-1624-08)

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C34			CC73FCH1H060D	CHIP C 6PF D		
C35			CK73FB1H102K	CHIP C 1000PF K		
C36			CC73FCH1H070D	CHIP C 7PF D		
C37 ,38			CK73FB1H103K	CHIP C 0.010UF K		
C39			CK73FB1H332K	CHIP C 3300PF K		
C40			CC73FCH1H101J	CHIP C 100PF J		
C41			CK73EB1E104K	CHIP C 0.10UF K		
C42 -44			CK73FB1H472K	CHIP C 4700PF K		
C45			CK73FB1H332K	CHIP C 3300PF K		
C46			CK73FB1H103K	CHIP C 0.010UF K		
C47			CK73FB1H471K	CHIP C 470PF K		
C48			CK73FB1H103K	CHIP C 0.010UF K		
C49			CK73FB1H222K	CHIP C 2200PF K		
C50			CC73FCH1H180J	CHIP C 18PF J		
C51			CE04EW1C102M	ELECTRO 1000UF 16WV		
C52			CK73FB1H222K	CHIP C 2200PF K		
C53			CS15E1C100M	TANTAL 10UF 16WV		
C54			CK73FB1H222K	CHIP C 2200PF K		
C55			CK73FB1H102K	CHIP C 1000PF K		
C56 ,57			CK73FB1H222K	CHIP C 2200PF K		
C58			CC73FCH1H330J	CHIP C 33PF J		
C59			CK73FB1H222K	CHIP C 2200PF K		
C60			CK73FB1H103K	CHIP C 0.010UF K		
C61			CK73FB1H222K	CHIP C 2200PF K		
C62			CC73FCH1H070D	CHIP C 7PF D		
C63			CK73FB1H102K	CHIP C 1000PF K		
C64			CC73FCH1H100D	CHIP C 10PF D		
C65			CS15E1A100M	TANTAL 10UF 10WV		
C66			CK73FB1H102K	CHIP C 1000PF K		
C67			CC73FCH1H080D	CHIP C 8PF D		
C68			CK73FB1H102K	CHIP C 1000PF K		
C69			CC73FCH1H100D	CHIP C 10PF D		
C70			CC73FCH1H050C	CHIP C 5PF C		
C71 ,72			CK73FB1H102K	CHIP C 1000PF K		
C73 ,74			CC73FCH1H330J	CHIP C 33PF J		
C75 ,76			CK73EB1E104K	CHIP C 0.10UF K		
C77			CK73FB1H103K	CHIP C 0.010UF K		
C78			CS15E1A100M	TANTAL 10UF 10WV		
C79			CK73EB1E104K	CHIP C 0.10UF K		
C80			CE04EW1C100M	ELECTRO 10UF 16WV		
C81			CE04EW0J102M	ELECTRO 1000UF 6.3WV		
C82 ,83			CK73FB1H103K	CHIP C 0.010UF K		
C84			CE04EW1H4R7M	ELECTRO 4.7UF 50WV		
C85			CE04EW1A470M	ELECTRO 47UF 10WV		
C86			CK73FB1E333K	CHIP C 0.033UF K		
C87			CK73FB1H102K	CHIP C 1000PF K		
C88			CK73FB1H103K	CHIP C 0.010UF K		
C89			CK73FB1E393K	CHIP C 0.039UF K		
C90			CE04EW1A101M	ELECTRO 100UF 10WV		
C91			CQ92M1H104K	MYLAR 0.10UF K		
C92			CS15E1A100M	TANTAL 10UF 10WV		
C93			CQ92M1H473K	MYLAR 0.047UF K		
C94			CQ92M1H223K	MYLAR 0.022UF K		
C95 ,96			CK73FB1H102K	CHIP C 1000PF K		
C97			CC73FCH1H560J	CHIP C 56PF J		

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C98			CC73FCH1H030C	CHIP C	3PF	C		
C99			CC73FCH1H070D	CHIP C	7PF	D		
C100			CE04NW1H2R2M	ELECTRO	2.2UF	50WV		
C101			CK73FB1H102K	CHIP C	1000PF	K		
C102			CC73FCH1H150J	CHIP C	15PF	J		
C103			CK73FB1H223K	CHIP C	0.022UF	K		
C104			CK73FB1H152K	CHIP C	1500PF	K		
C105			CC73FCH1H101J	CHIP C	100PF	J		
C106			CC73FCH1H820J	CHIP C	82PF	J		
C107			CE04NW1A101M	ELECTRO	100UF	10WV		
C108			CK73FB1H222K	CHIP C	2200PF	K		
C109			CC73FCH1H050C	CHIP C	5PF	C		
C110			CE04NW1A101M	ELECTRO	100UF	10WV		
C111,112			CK73FB1H102K	CHIP C	1000PF	K		
C113			CC73FCH1H560J	CHIP C	56PF	J		
C114			CC73FCH1H470J	CHIP C	47PF	J		
C115			CK73FB1H103K	CHIP C	0.010UF	K		
C116			CE04EW1A101M	ELECTRO	100UF	10WV		
C117			CK73FB1H102K	CHIP C	1000PF	K		
C118,119			CC73FCH1H101J	CHIP C	100PF	J		
C120			CK73FB1H102K	CHIP C	1000PF	K		
C121			CK73FB1H103K	CHIP C	0.010UF	K		
C122			CQ92M1H224K	MYLAR	0.22UF	K		
C123			CE04EW0J102M	ELECTRO	1000UF	6.3WV		
C124			CE04EW1C102M	ELECTRO	1000UF	16WV		
C125			CE04EW1A470M	ELECTRO	47UF	10WV		
C126			CE04EW1A221M	ELECTRO	220UF	10WV		
C127			CE04EW1A470M	ELECTRO	47UF	10WV		
C128			C92-0003-05	CHIP TAN	0.47UF	25WV		
C129			CC73FCH1H330J	CHIP C	33PF	J		
C130			CE04NW1H2R2M	ELECTRO	2.2UF	50WV		
C131			CK73FB1H102K	CHIP C	1000PF	K		
C132			CE04NW1HR22M	ELECTRO	0.22UF	50WV		
C133			CE04EW1C100M	ELECTRO	10UF	16WV		
C134			CK73FB1H222K	CHIP C	2200PF	K		
C135			CC73FCH1H220J	CHIP C	22PF	J		
C136			CK73FB1H102K	CHIP C	1000PF	K		
C137			CK73FB1H471K	CHIP C	470PF	K		
C138			CE04EW1C100M	ELECTRO	10UF	16WV		
C139			CK73FB1H223K	CHIP C	0.022UF	K		
C140			CE04EW1A101M	ELECTRO	100UF	10WV		
C141			CC73FCH1H150J	CHIP C	15PF	J		
C142			CK73FB1H472K	CHIP C	4700PF	K		
C143			CC73FCH1H050C	CHIP C	5PF	C		
C144			CC73FCH1H020C	CHIP C	2PF	C		
C145			CC73FCH1H330J	CHIP C	33PF	J		
C148,149			CK73FB1H102K	CHIP C	1000PF	K		
C150-152			CC73FCH1H101J	CHIP C	100PF	J		
C153			CK73FB1H102K	CHIP C	1000PF	K		
C154			CC73FCH1H220J	CHIP C	22PF	J		
C155			CK73FB1H102K	CHIP C	1000PF	K		
C156			CC73FCH1H101J	CHIP C	100PF	J		
C158			CK73FB1H102K	CHIP C	1000PF	K		
C158,159			CC73FCH1H101J	CHIP C	100PF	J		
TC1			C05-0350-05	TRIM. CAP		20PF		

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TX-RX UNIT (W02-1624-08)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
J2			E40-5353-08	PIN CONNECTOR (2P)		
J5			E40-5354-08	PIN CONNECTOR (3P)		
J6			E40-3238-05	PIN CONNECTOR (3P)		
J7		*	E40-5443-08	PIN CONNECTOR (14P)		
TP1 ,2			E23-0512-05	TEST PIN		
		*	F10-1463-08	SHILDING CASE (A)		
		*	F10-1464-08	SHILDING CASE (B)		
		*	F10-1465-08	SHILDING CASE (C)		
		*	F11-1117-08	SHILDING PLATE (IF)		
L1		*	L34-1320-08	COIL		
L2			L33-0732-08	CHIP COIL 10UH		
L3			L34-1291-08	COIL		
L4			L34-1290-08	COIL		
L5			L34-1291-08	COIL		
L6			L34-1292-08	COIL		
L7 ,8			L34-4039-15	RF COIL		
L9			L34-4096-08	IF COIL		
L10			L71-0300-08	MCF(21.6MHZ)		
L11			L33-0732-08	CHIP COIL 10UH		
L12			L40-1021-41	CHIP COIL 1MH		
L13			L34-0908-05	COIL		
L14			L34-0893-05	COIL		
L15			L34-1032-05	COIL		
L16			L34-0894-05	COIL		
L17			L77-1424-08	CRYSTAL RESONATOR (21.145MHZ)		
L18			L72-0316-05	CERAMIC FILTER (CFW455E)		
L19			L33-0732-08	CHIP COIL 10UH		
L20			L30-0503-05	COIL		
L21			L40-1021-41	CHIP COIL 1MH		
L22			L33-0731-08	CHIP COIL 1UH		
L23		*	L34-1319-08	COIL		
L24		*	L34-1321-08	COIL		
L25			L33-0732-08	CHIP COIL 10UH		
L26		*	L77-1443-08	CRYSTAL RESONATOR (12.8MHZ)		
L27			L33-0732-08	CHIP COIL 10UH		
L28 ,29			L34-4039-15	RF COIL		
L30			L34-0894-05	COIL		
101	2B		N10-3020-41	NUT M3		
K	2A		N30-3008-41	PAN HEAD MACHINE SCREW		
R2			RK73FB2A103J	CHIP R 10K J 1/10W		
R3			RK73FB2A330J	CHIP R 33 J 1/10W		
R4			RK73FB2A104J	CHIP R 100K J 1/10W		
R5			RK73FB2A154J	CHIP R 150K J 1/10W		
R6			RK73FB2A684J	CHIP R 680K J 1/10W		
R7			RK73FB2A104J	CHIP R 100K J 1/10W		
R8			RK73FB2A473J	CHIP R 47K J 1/10W		
R9			RK73FB2A330J	CHIP R 33 J 1/10W		
R10 -13			RK73FB2A104J	CHIP R 100K J 1/10W		
R14			RK73FB2A100J	CHIP R 10 J 1/10W		
R15 -17			RK73FB2A104J	CHIP R 100K J 1/10W		
R18			RK73FB2A155J	CHIP R 1.5M J 1/10W		
R19			RK73FB2A154J	CHIP R 150K J 1/10W		
R20			RK73FB2A104J	CHIP R 100K J 1/10W		
R21			RK73FB2A681J	CHIP R 680 J 1/10W		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R22			RK73FB2A100J	CHIP R 10 J 1/10W		
R23			RK73FB2A821J	CHIP R 820 J 1/10W		
R24			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R25			RK73FB2A680J	CHIP R 68 J 1/10W		
R26			RK73FB2A101J	CHIP R 100 J 1/10W		
R27			RK73FB2A681J	CHIP R 680 J 1/10W		
R28			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R29			RK73FB2A104J	CHIP R 100K J 1/10W		
R30			RK73FB2A223J	CHIP R 22K J 1/10W		
R31 -33			RK73FB2A335J	CHIP R 3.3M J 1/10W		
R34			RK73FB2A183J	CHIP R 18K J 1/10W		
R35 -37			R92-0687-05	CHIP R 0 OHM		
R38			RK73FB2A474J	CHIP R 470K J 1/10W		
R39			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R40			RK73FB2A104J	CHIP R 100K J 1/10W		
R41 ,42			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R44			RK73FB2A204J	CHIP R 200K J 1/10W		
R45			RK73FB2A223J	CHIP R 22K J 1/10W		
R46			R92-1201-05	SILID 220 1/2W		
R47			R92-0685-05	CHIP R 22 J 1/2W		
R48			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R49			RK73FB2A271J	CHIP R 270 J 1/10W		
R50			RK73FB2A331J	CHIP R 330 J 1/10W		
R51			RK73FB2A101J	CHIP R 100 J 1/10W		
R52			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R53			RK73FB2A101J	CHIP R 100 J 1/10W		
R54			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R55			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R56			RD14BB2C222J	RD 2.2K J 1/6W		
R57			RK73FB2A683J	CHIP R 68K J 1/10W		
R58			RK73FB2A680J	CHIP R 68 J 1/10W		
R59			RK73FB2A221J	CHIP R 220 J 1/10W		
R60			RK73FB2A330J	CHIP R 33 J 1/10W		
R61 ,62			RK73FB2A473J	CHIP R 47K J 1/10W		
R63			RK73FB2A330J	CHIP R 33 J 1/10W		
R64			RK73FB2A221J	CHIP R 220 J 1/10W		
R65 ,66			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R67			RK73FB2A223J	CHIP R 22K J 1/10W		
R68			RK73FB2A471J	CHIP R 470 J 1/10W		
R69			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R70			RK73FB2A471J	CHIP R 470 J 1/10W		
R71 ,72			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R73 ,74			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R75			RK73FB2A473J	CHIP R 47K J 1/10W		
R76			RK73FB2A334J	CHIP R 330K J 1/10W		
R77 -79			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R80			RK73FB2A104J	CHIP R 100K J 1/10W		
R81			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R82			RK73FB2A104J	CHIP R 100K J 1/10W		
R83			RK73FB2A103J	CHIP R 10K J 1/10W		
R84			R92-0687-05	CHIP R 0 OHM		
R85			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R86			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R87			RK73FB2A181J	CHIP R 180 J 1/10W		
R88			RK73FB2A102J	CHIP R 1.0K J 1/10W		

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TX-RX UNIT (W02-1624-08)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R89 ,90			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R91			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R92			RK73FB2A474J	CHIP R 470K J 1/10W		
R93			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R94			RK73FB2A155J	CHIP R 1.5M J 1/10W		
R95			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R96			RK73FB2A221J	CHIP R 220 J 1/10W		
R97			RK73FB2A681J	CHIP R 680 J 1/10W		
R98			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R99			RK73FB2A100J	CHIP R 10 J 1/10W		
R100			RK73FB2A473J	CHIP R 47K J 1/10W		
R101			RK73FB2A221J	CHIP R 220 J 1/10W		
R102			RK73FB2A330J	CHIP R 33 J 1/10W		
R103			RK73FB2A474J	CHIP R 470K J 1/10W		
R104			RK73FB2A103J	CHIP R 10K J 1/10W		
R105			RK73FB2A124J	CHIP R 120K J 1/10W		
R106-108			RK73FB2A103J	CHIP R 10K J 1/10W		
R109			RK73FB2A224J	CHIP R 220K J 1/10W		
R110			RK73FB2A104J	CHIP R 100K J 1/10W		
R111			RK73FB2A473J	CHIP R 47K J 1/10W		
R112			RK73FB2A335J	CHIP R 3.3M J 1/10W		
R113			RD14DB3A6R8J	SMALL-RD 6.8 J 1W		
R114			R92-1061-05	JUMPER REST 0 ΩHM		
R115			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R116			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R117			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R118			RK73FB2A331J	CHIP R 330 J 1/10W		
R119			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R120			RK73FB2A223J	CHIP R 22K J 1/10W		
R121			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R122			RK73FB2A333J	CHIP R 33K J 1/10W		
R123			RK73FB2A104J	CHIP R 100K J 1/10W		
R124,125			RK73FB2A204J	CHIP R 200K J 1/10W		
R126			RK73FB2A184J	CHIP R 180K J 1/10W		
R127			RK73FB2A185J	CHIP R 1.8M J 1/10W		
R128			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R129			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R130			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R131			RK73FB2A223J	CHIP R 22K J 1/10W		
R132			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R133			RK73FB2A220J	CHIP R 22 J 1/10W		
R134			RK73FB2A394J	CHIP R 390K J 1/10W		
R135			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R136			RD14DB3A221J	SMALL-RD 220 J 1W		
R137			RK73FB2A473J	CHIP R 47K J 1/10W		
R138			RK73FB2A104J	CHIP R 100K J 1/10W		
R139			RK73FB2A103J	CHIP R 10K J 1/10W		
R140			RK73FB2A153J	CHIP R 15K J 1/10W		
R141			R92-1061-05	JUMPER REST 0 ΩHM		
VR1			R12-1069-05	TRIMMING PΩT. (4.7K)		
VR2			R12-1066-05	TRIMMING PΩT. (1K)		
VR3			R12-3099-05	TRIMMING PΩT. (47K)		
TH1 ,2			TSD2FIL154S	THERMISTER 150K		

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TX-RX UNIT (W02-1624-08)
CONTROL UNIT (W02-16XX-08)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D1 ,2			1SS106	DIODE		
D3			MI407	DIODE		
D4			MI308	DIODE		
D5 -7			1SV166	VARI-CAP DIODE		
D8			1SS226	CHIP DIODE		
D9		*	1SS190	CHIP DIODE		
D10		*	1SS53	DIODE		
D11			1SV166	VARI-CAP DIODE		
D12			DSA3A1	DIODE		
D13			1SV166	VARI-CAP DIODE		
D14			1SV164	VARI-CAP DIODE		
D15		*	1SS238	DIODE		
D16 ,17		*	1SS53	DIODE		
D18			1SS226	CHIP DIODE		
IC1			NJM2904M	IC(OP AMP X2)		
IC2	1B		M57710-A	IC(POWER MODULE)		
IC3			MC3361P	IC(FM IF SYSTEM)		
IC4			TC9154AP	IC(2CH ELECTRONIC VOLUME)		
IC5	2A	*	M5F7806	IC(VOLTAGE REGULATOR/+6V)		
IC6			MB87014A	IC(PLL)		
IC7			UPD4094BG	IC(8 STAGE SHIFT REGISTER))		
IC8	2A		UPC1242H	IC(AF POWER AMP.)		
IC9 ,10			FMW-1	CHIP TRANSISTOR ARRAY		
IC11			NJM4558M	IC(OP AMP X2))		
Q1 ,2			3SK131V12	CHIP FET		
Q3			2SK302GR	CHIP FET		
Q4 -6			2SC2712GR	CHIP TRANSISTOR		
Q7			2SA1162GR	CHIP TRANSISTOR		
Q8 ,9			2SC2712GR	CHIP TRANSISTOR		
Q10			2SC2407(1)	TRANSISTOR		
Q11			3SK131V12	CHIP FET		
Q12		*	2SC3606	CHIP TRANSISTOR		
Q13			2SC2757T33	CHIP TRANSISTOR		
Q14		*	2SB1215S	CHIP TRANSISTOR		
Q16 ,17			2SC2712GR	CHIP TRANSISTOR		
Q18 ,19		*	2SC3606	CHIP TRANSISTOR		
Q20	2B		2SB1015Y	TRANSISTOR		
Q21			2SB1119S	CHIP TRANSISTOR		
Q22 ,23			2SC2712GR	CHIP TRANSISTOR		
CONTROL UNIT (W02-16XX-08) 1625 : K,K2,M,M2 1651 : P,P2 1652 : X,X2						
201	1F	*	B11-0497-08	REFLECTOR (LCD)		
PL201		*	B30-2002-08	LAMP (5V 115MA)		
C201			CE04NW1C100M	ELECTRO 10UF 16WV		
C202			CK73FB1H102K	CHIP C 1000PF K		
C203			CC73FCH1H101J	CHIP C 100PF J		
C204			CK73FB1H333K	CHIP C 0.033UF K		
C205			CK73FB1H102K	CHIP C 1000PF K		
C206,207			CC73FCH1H473J	CHIP C 0.047UF J		
C208			CK73FB1H103K	CHIP C 0.010UF K		
C209			CK73FB1H102K	CHIP C 1000PF K		
C210			CE04NW1C100M	ELECTRO 10UF 16WV		
C211			CK73FB1H102K	CHIP C 1000PF K		
C212,213			CC73FCH1H330J	CHIP C 33PF J		
C214			CC73FCH1H473J	CHIP C 0.047UF J		

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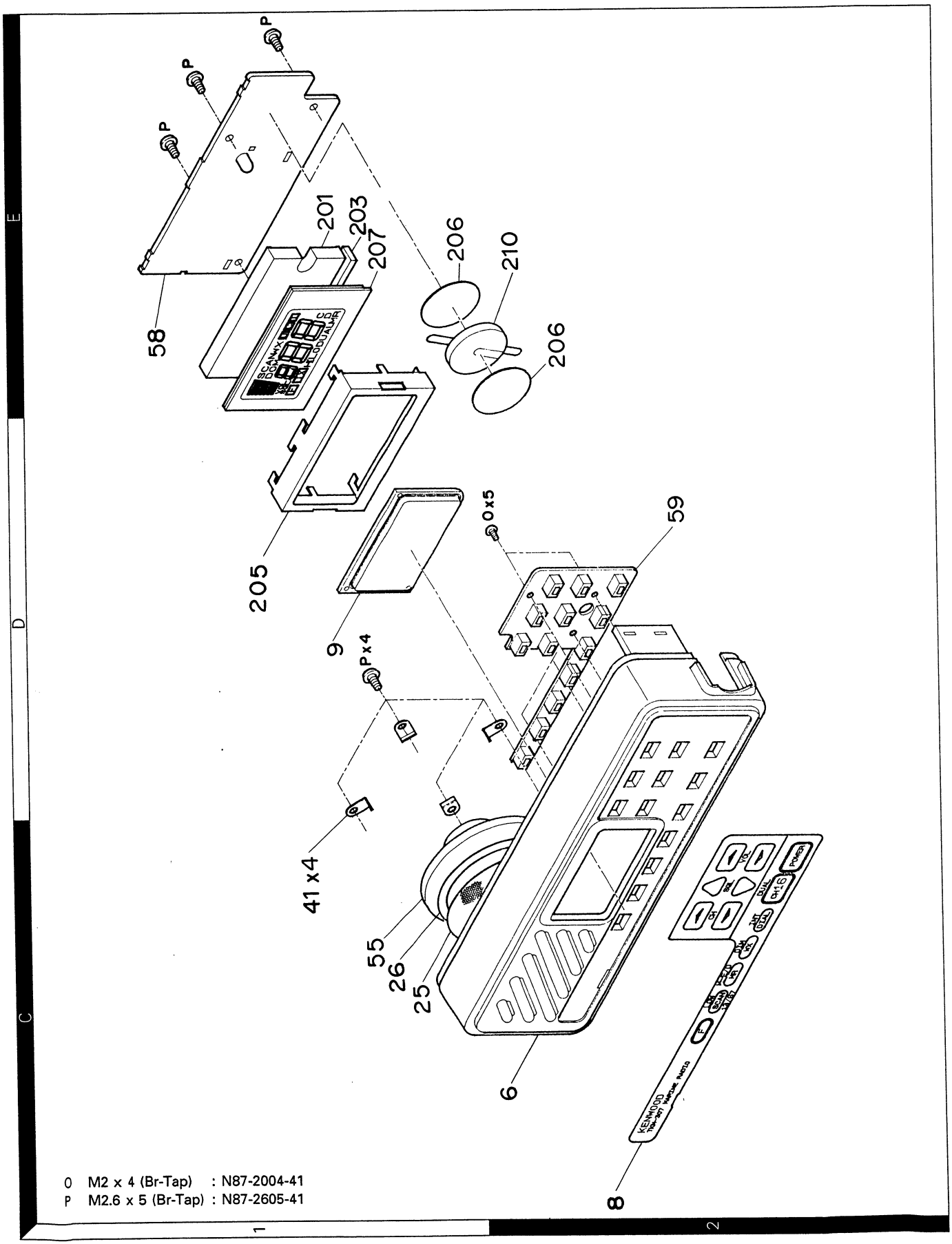
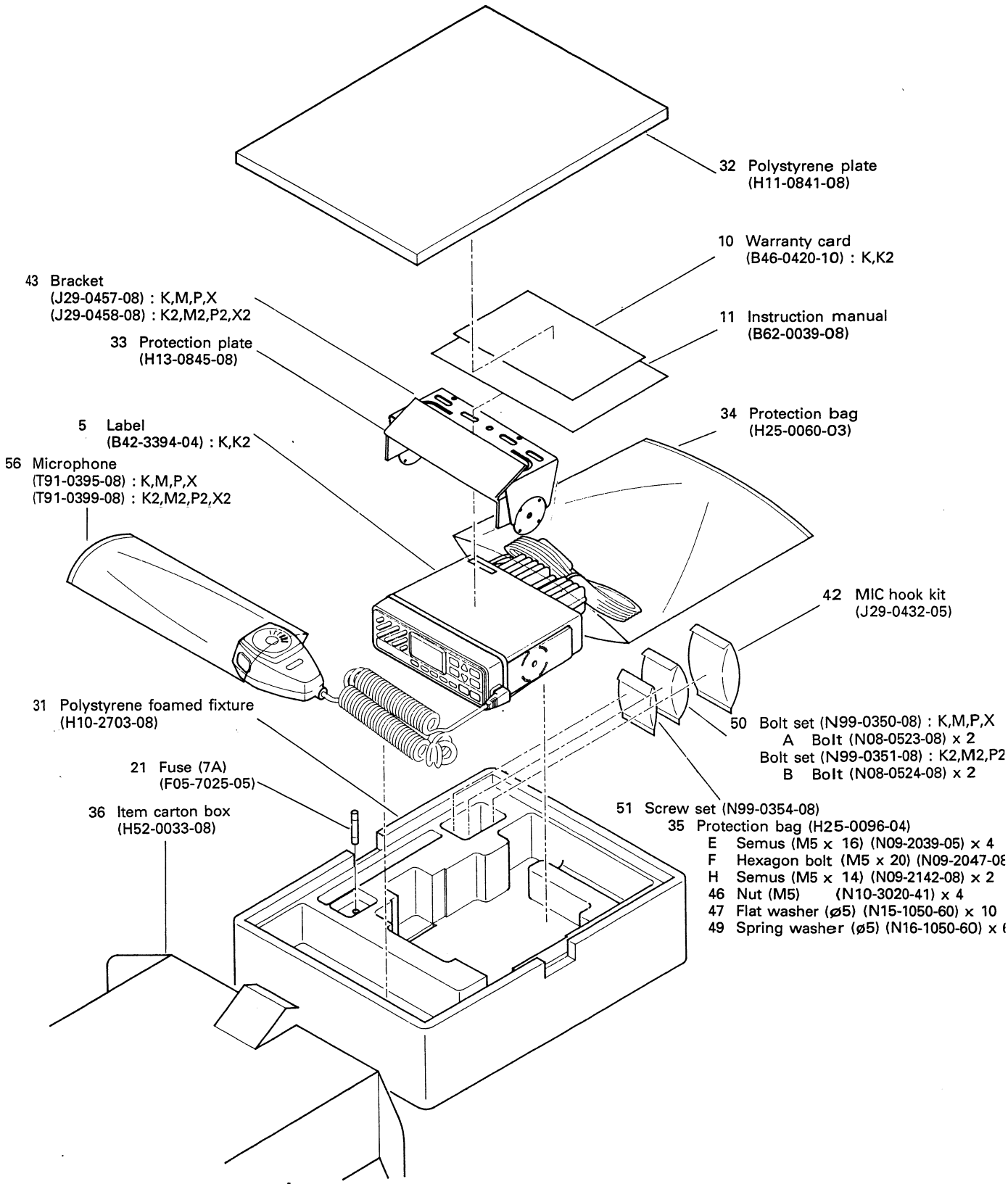
EXPLODED VIEW



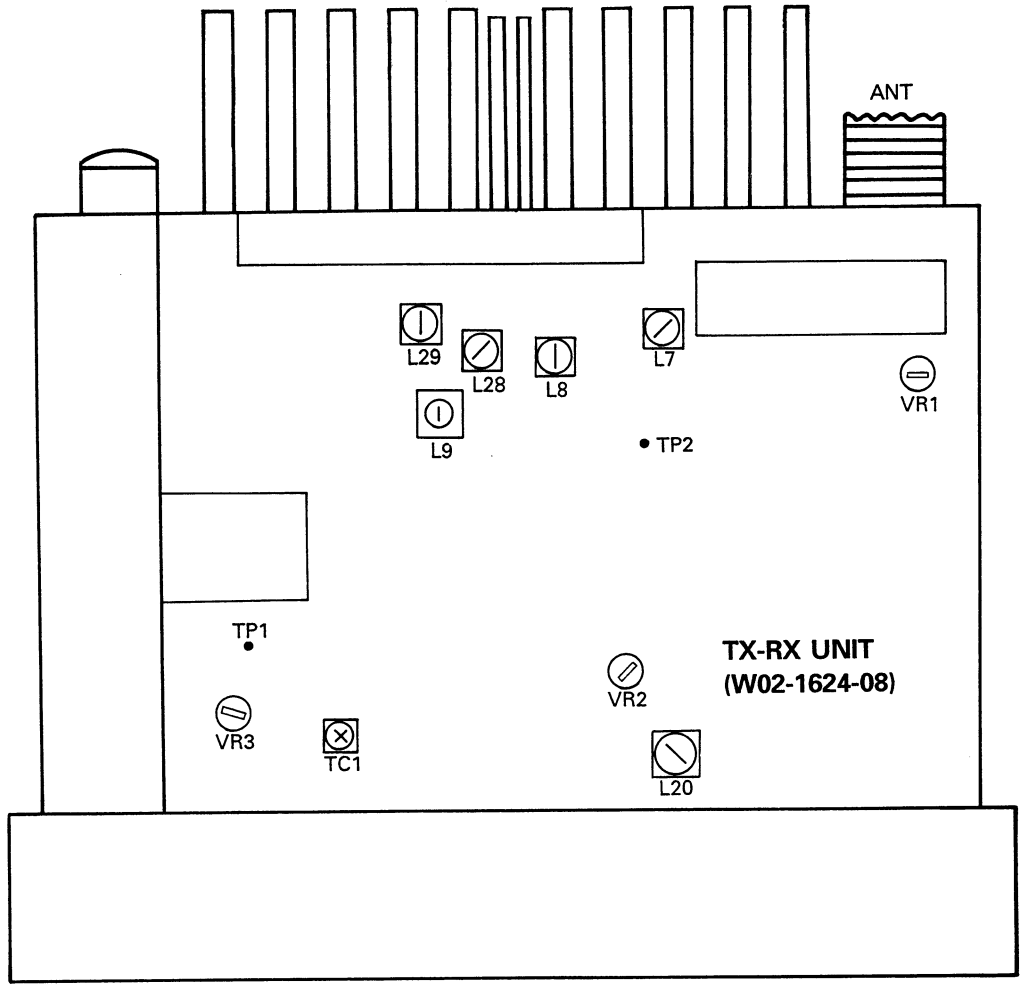
0 M2 x 4 (Br-Tap) : N87-2004-41
P M2.6 x 5 (Br-Tap) : N87-2605-41

PACKING


32 Polystyrene plate
(H11-0841-08)
10 Warranty card
(B46-0420-10) : K,K2
43 Bracket
(J29-0457-08) : K,M,P,X
(J29-0458-08) : K2,M2,P2,X2
11 Instruction manual
(B62-0039-08)
33 Protection plate
(H13-0845-08)
34 Protection bag
(H25-0060-03)
5 Label
(B42-3394-04) : K,K2
56 Microphone
(T91-0395-08) : K,M,P,X
(T91-0399-08) : K2,M2,P2,X2
42 MIC hook kit
(J29-0432-05)
31 Polystyrene foamed fixture
(H10-2703-08)
50 Bolt set (N99-0350-08) : K,M,P,X
A Bolt (N08-0523-08) x 2
Bolt set (N99-0351-08) : K2,M2,P2
B Bolt (N08-0524-08) x 2
21 Fuse (7A)
(F05-7025-05)
36 Item carton box
(H52-0033-08)
51 Screw set (N99-0354-08)
35 Protection bag (H25-0096-04)
E Semus (M5 x 16) (N09-2039-05) x 4
F Hexagon bolt (M5 x 20) (N09-2047-08
H Semus (M5 x 14) (N09-2142-08) x 2
46 Nut (M5) (N10-3020-41) x 4
47 Flat washer (ø5) (N15-1050-60) x 10
49 Spring washer (ø5) (N16-1050-60) x

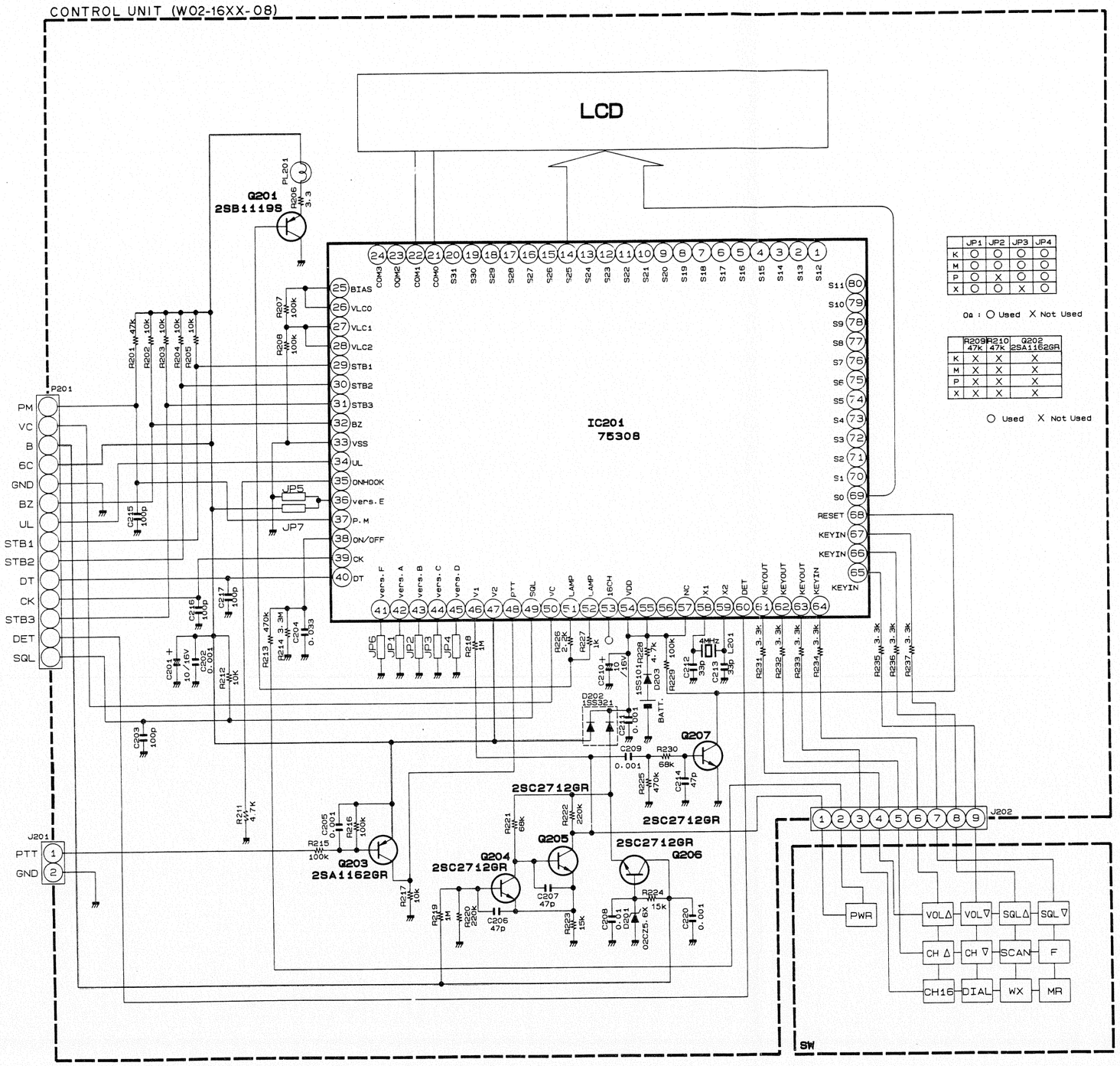
ADJUSTMENT

Adjustment Points (Top View)



TKM-307 SCHEMATIC DIAGRAM / PC BOARD VIEWS

CONTROL UNIT (W02-16XX-08)



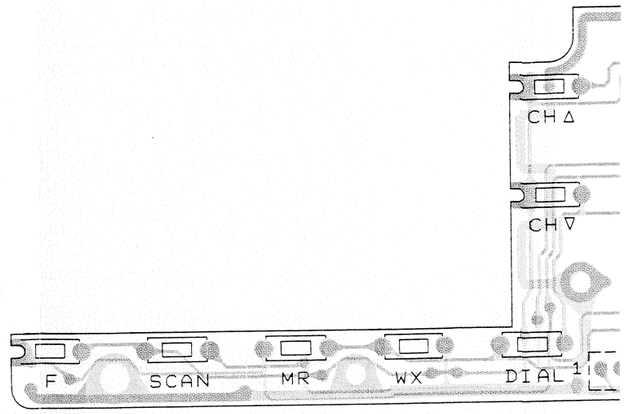
	JP1	JP2	JP3	JP4
K	○	○	○	○
M	○	○	○	○
P	○	X	○	○
X	○	○	X	○

○ : ○ Used X Not Used

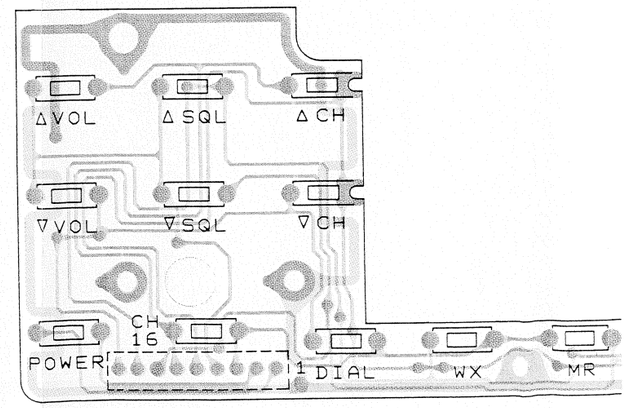
	R209 47k	R210 47k	Q202 2SA1162GR
K	X	X	X
M	X	X	X
P	X	X	X
X	X	X	X

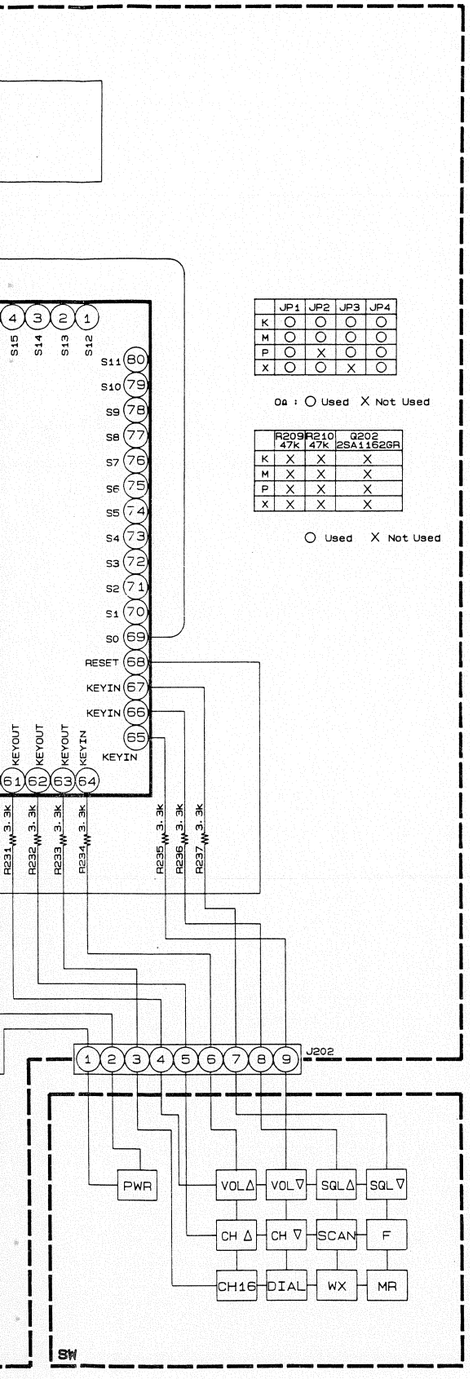
○ Used X Not Used

SWITCH UNIT ASS'Y (W02-1663-08) Component s



SWITCH UNIT ASS'Y (W02-1663-08) Foil side view





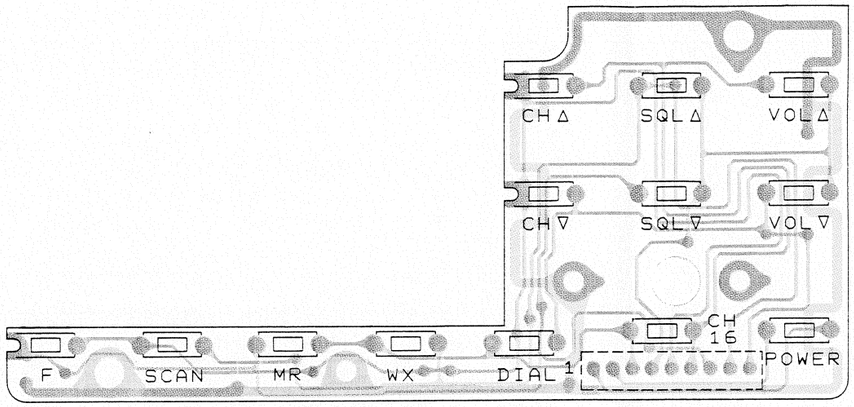
	JP1	JP2	JP3	JP4
K	○	○	○	○
M	○	○	○	○
P	○	×	○	○
X	○	○	×	○

Q4 : ○ Used × Not Used

	R209 47K	R210 47K	Q202 2SA1162GR
K	×	×	×
M	×	×	×
P	×	×	×
X	×	×	×

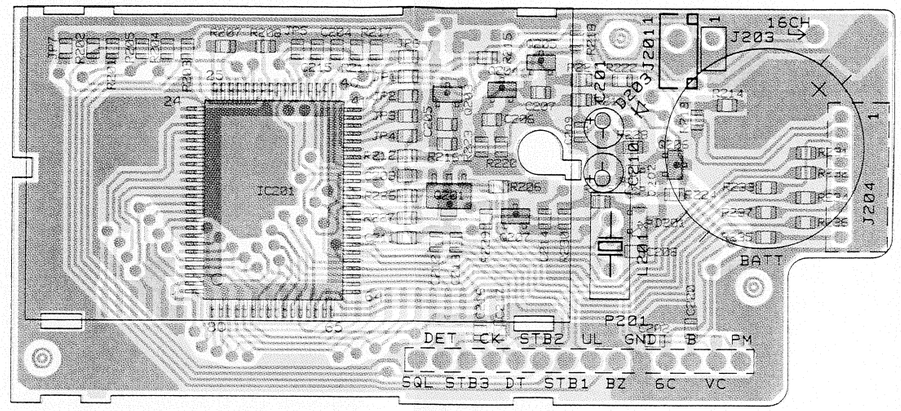
○ Used × Not Used

SWITCH UNIT ASS'Y (W02-1663-08) Component side view

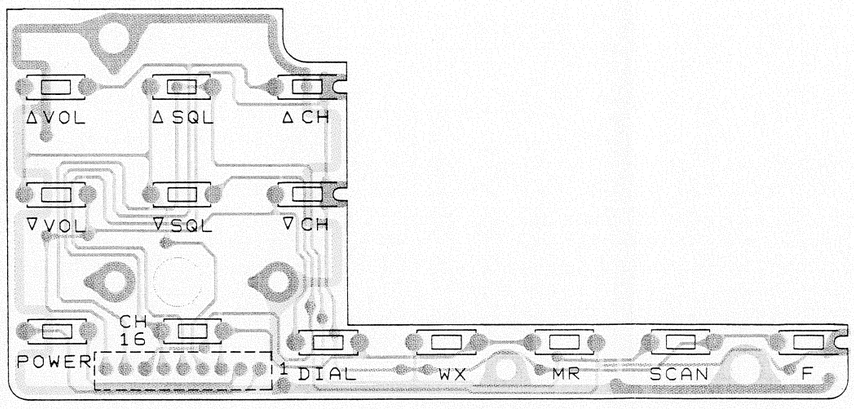


CONTROL UNIT (W02-16XX-08) 1625 : K,K2,M,M2 1651 : P,P2 1652 : X,X2

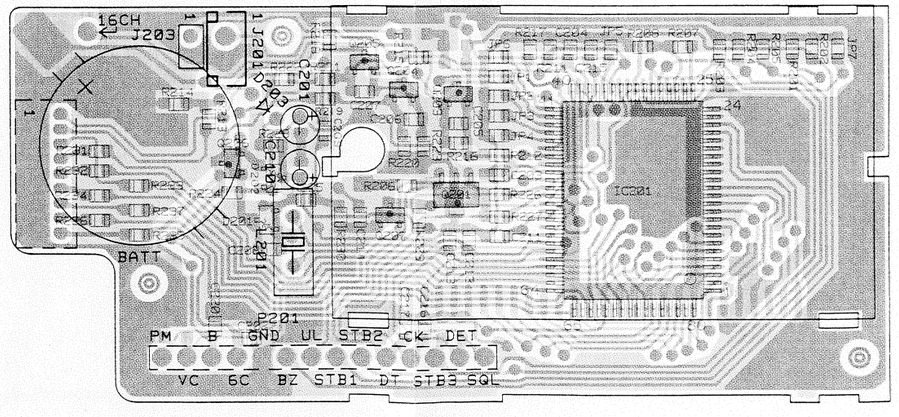
Component side view



SWITCH UNIT ASS'Y (W02-1663-08) Foil side view



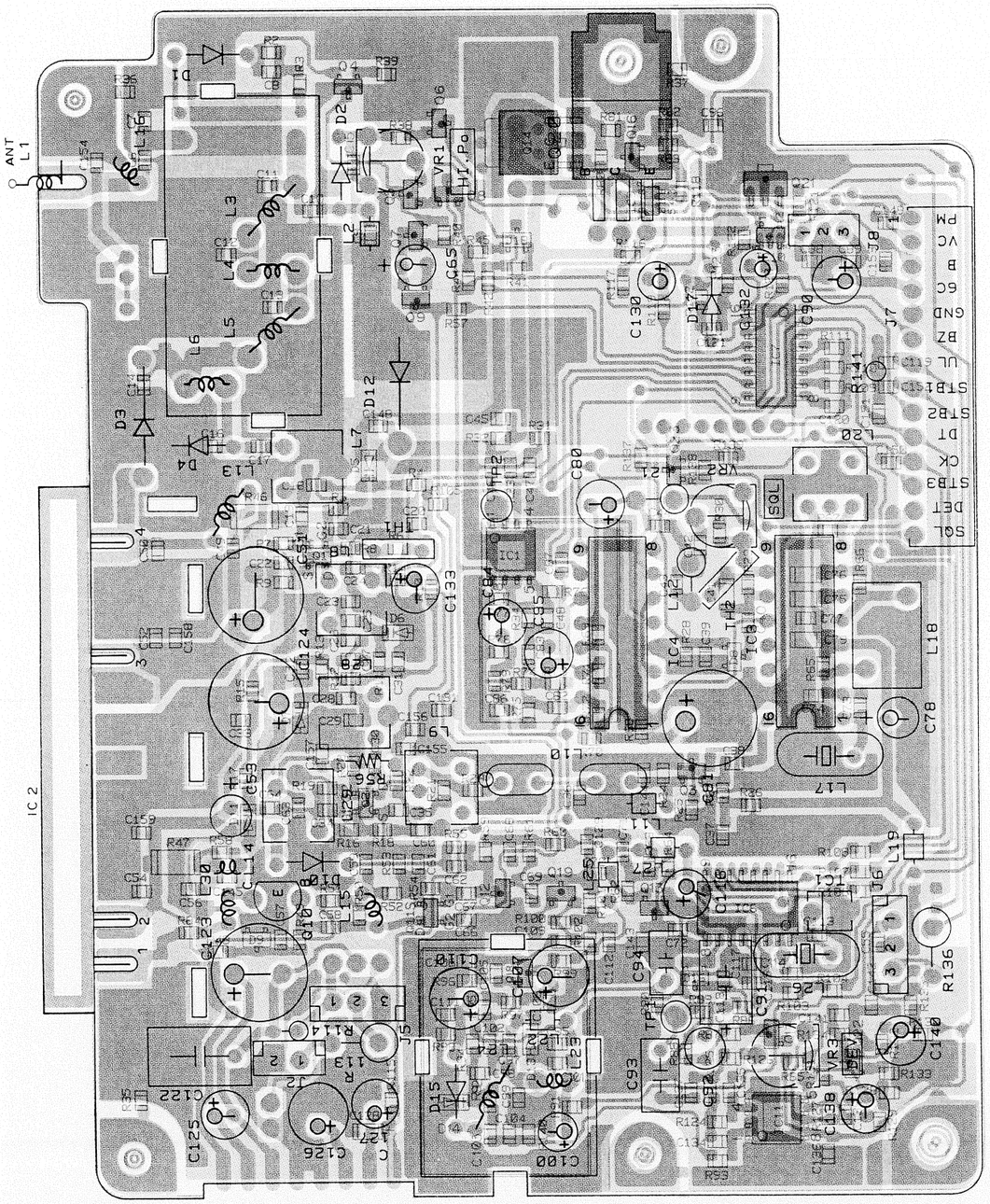
Foil side view



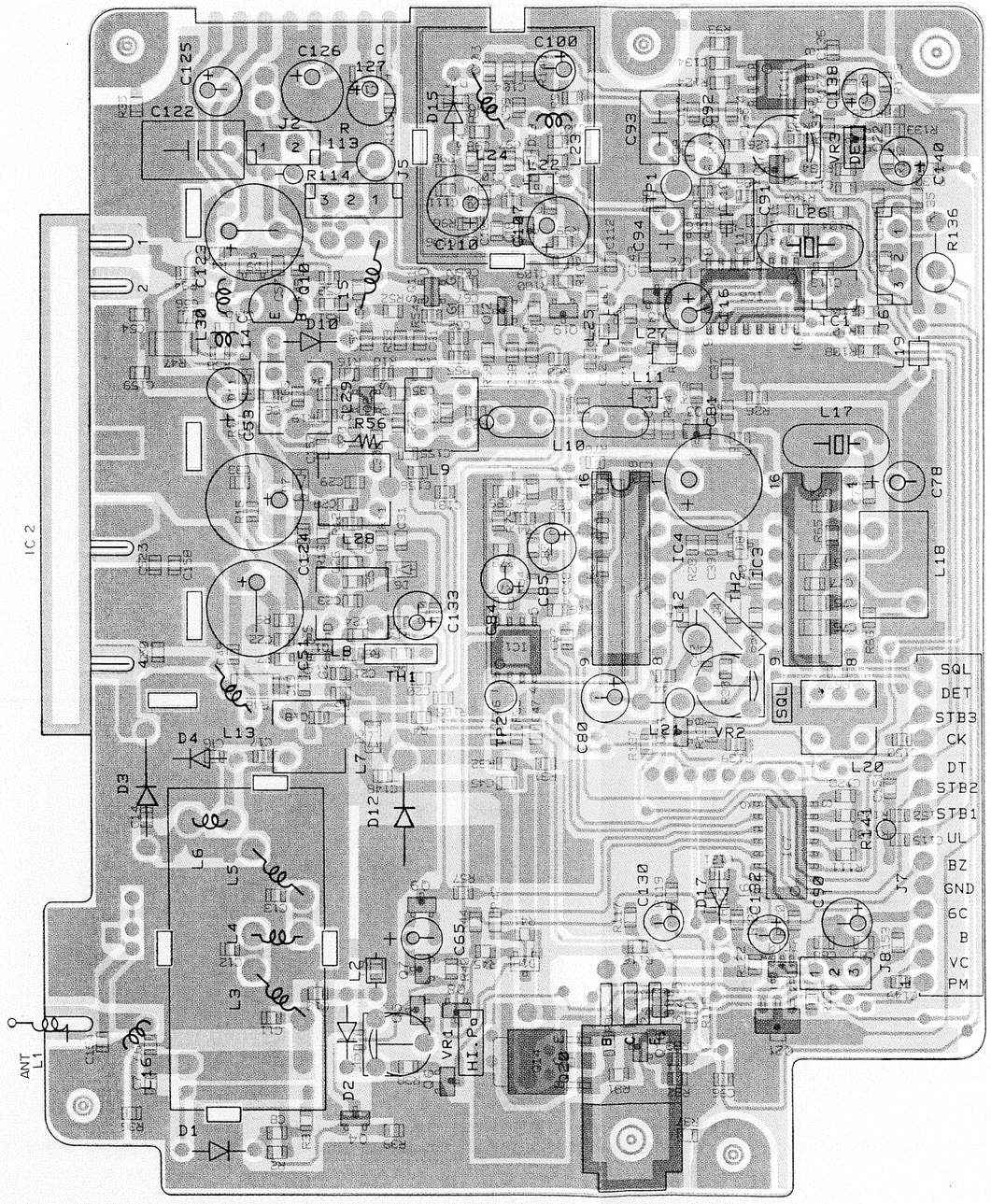
: Component side
: Foil side

TKM-307 PC BOARD VIEWS

TX-RX UNIT (W02-1624-08) Component side view

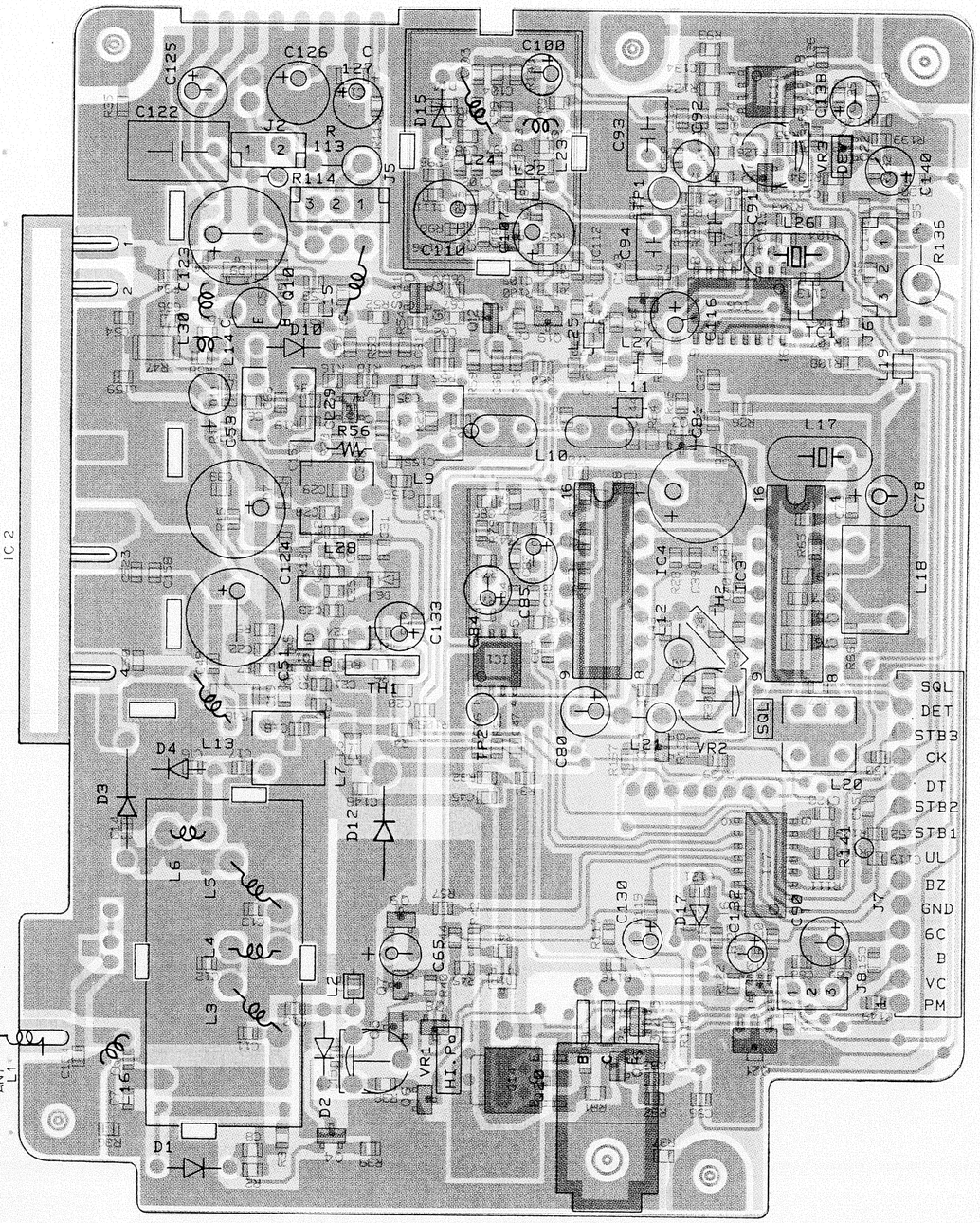


TX-RX UNIT (W02-1624-08) Foil side view



: Component side
: Foil side

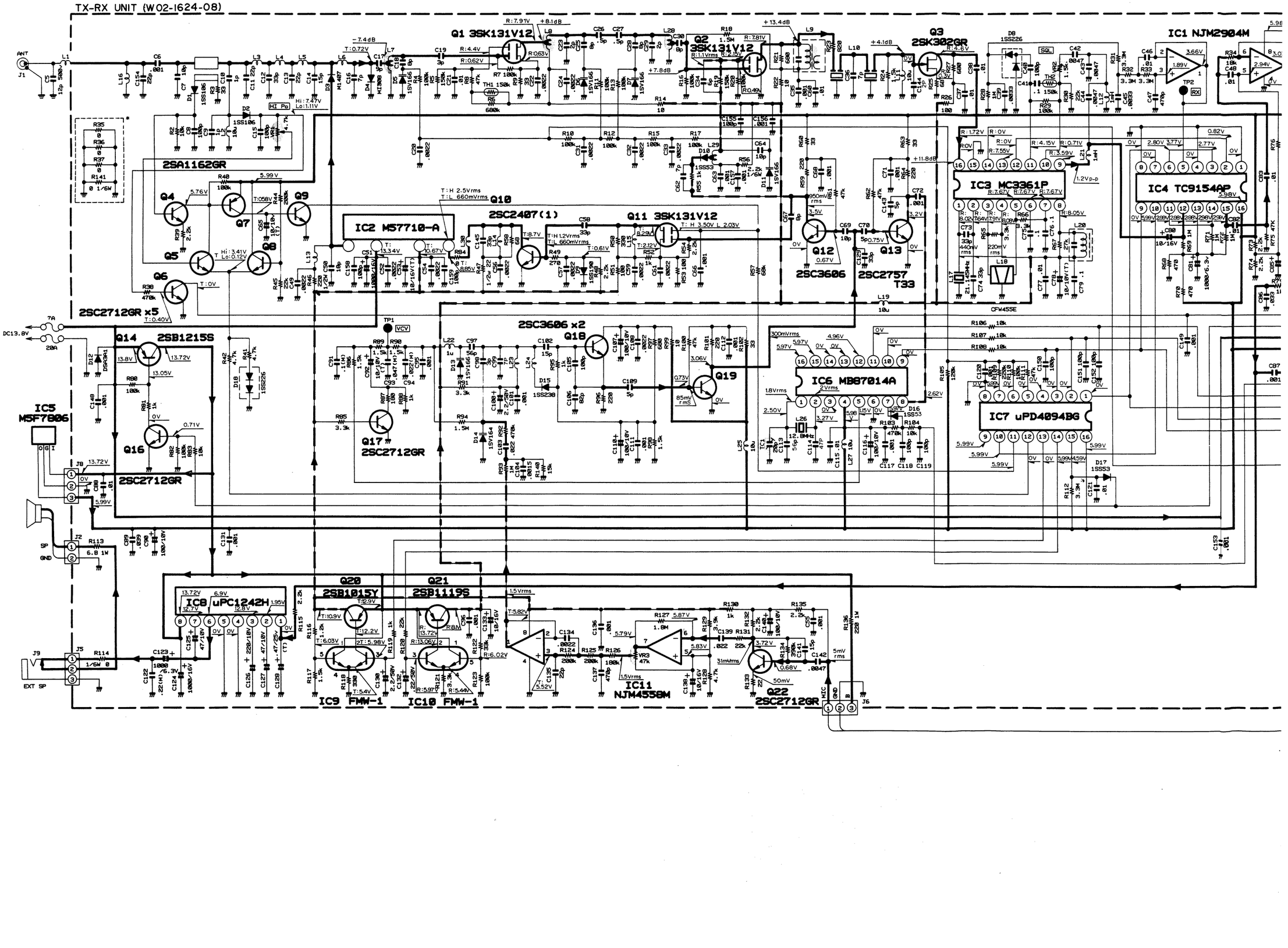
TX-RX UNIT (W02-1624-08) Foil side view

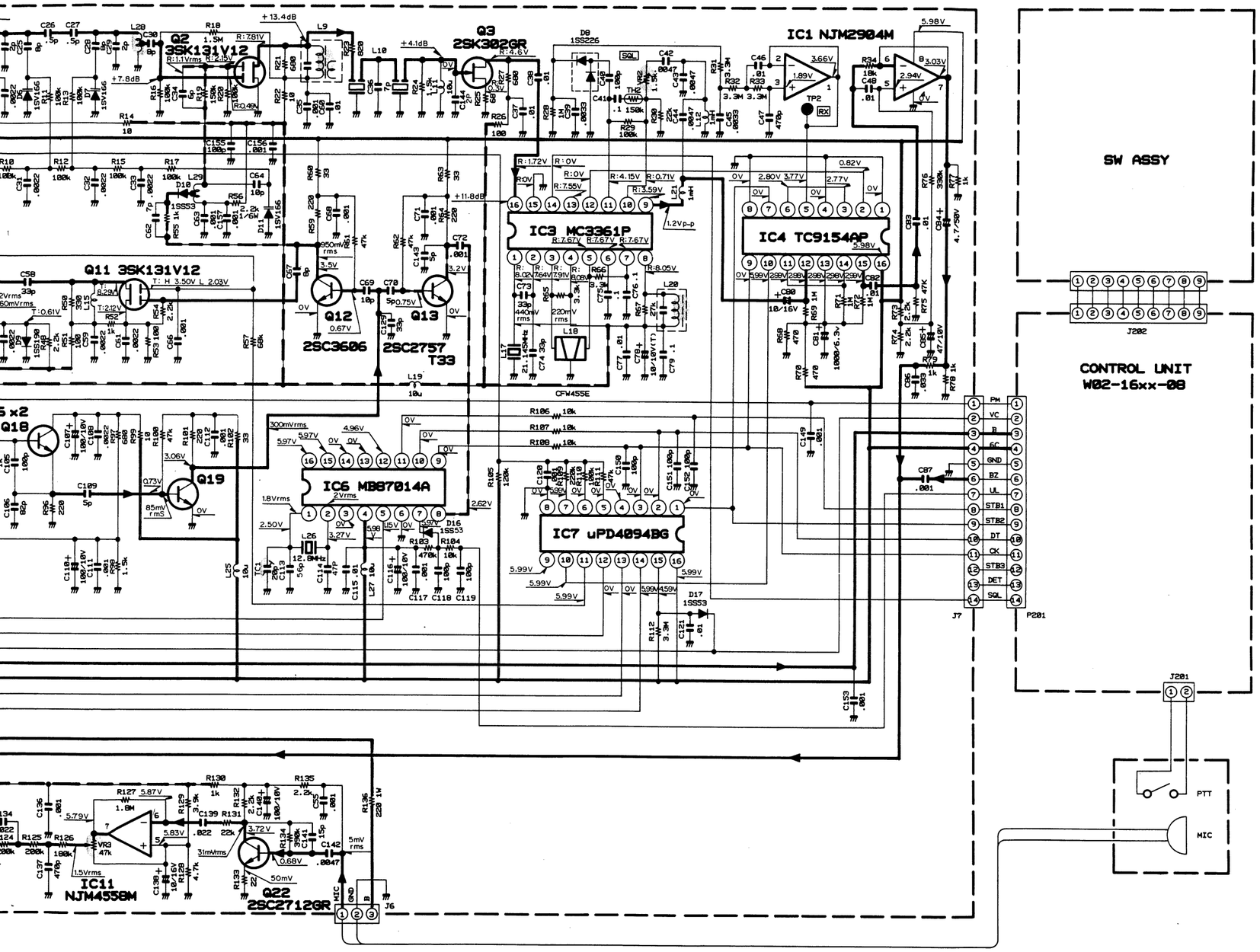


TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal Name	Terminal Function
TX-RX UNIT (W02-1624-08)			
J1	1	ANT	Antenna connector
J2	1	SP	Speaker output
	2	GND	GND
J5	1	EXT SP	External speaker jack
	2	EXT SP	External speaker jack
	3	GND	GND
J6	1	MIC	Microphone input
	2	GND	GND
	3	B	+B line
J7	1	PM	TX power detection
	2	VC	Main power switch control
	3	B	+B line
	4	6C	+6V
	5	GND	GND
	6	BZ	Touche tone output
	7	UL	PLL unlock detection
	8	STB1	PLL enable
	9	STB2	Shift register enable
	10	DT	PLL, shift register and electronic volume data
	11	CK	PLL, shift register and electronic volume clock
	12	STB3	
	13	DET	
	14	SQL	Squelch open/close signal
J8	1	I	6V AVR IC input
	2	G	6V AVR IC GND
	3	O	6V AVR IC output
CONTROL UNIT (W02-16XX-08)			
J201	1	PTT	Microphone PTT switch
	2	GND	GND
J202	1~9		Panel switch ↔ control unit
P201	1	PM	TX power detection
	2	VC	Main power switch control
	3	B	+B line
	4	6C	+6V
	5	GND	GND
	6	BZ	Touche tone output
	7	UL	PLL unlock detection
	8	STB1	PLL enable
	9	STB2	Shift register enable
	10	DT	PLL, shift register and electronic volume data
	11	CK	PLL, shift register and electronic volume clock
	12	STB3	
	13	DET	
	14	SQL	Squelch open/close signal

TKM-307 SCHEMATIC DIAGRAM



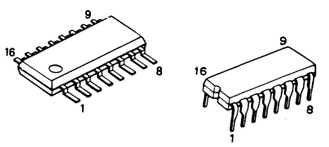


FMW-1

2SA1162GR

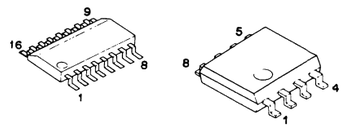
MB87014A

MC3361P
TC9154AP



µPD4094BG

NJM2904M
NJM4558M



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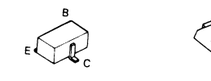

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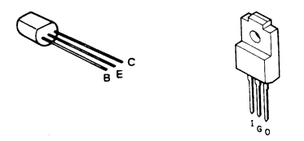

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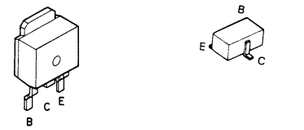

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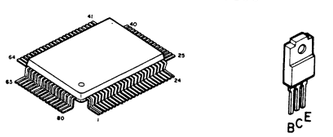
3SK131V12

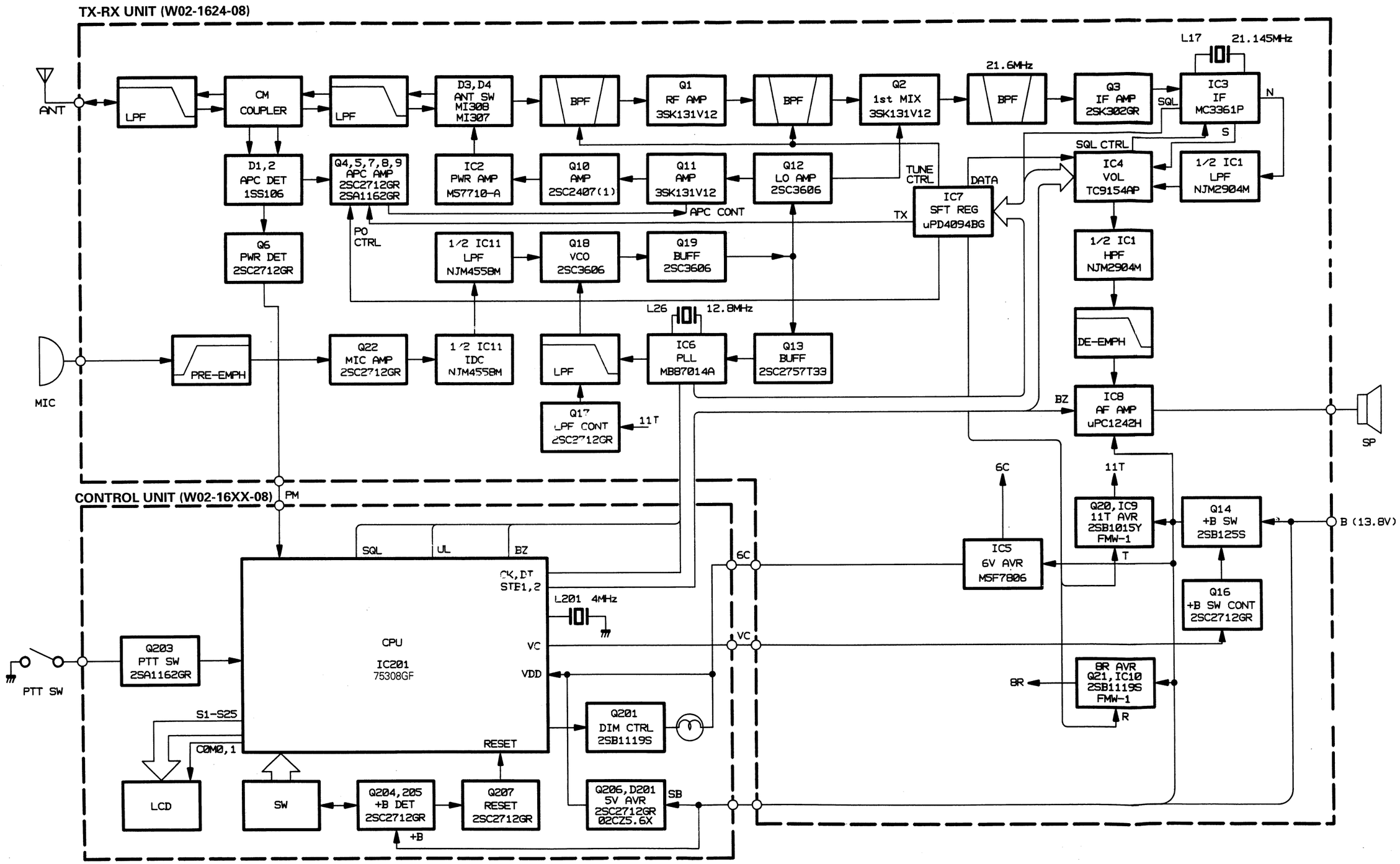
75308GF-690-3B9

M5F7806

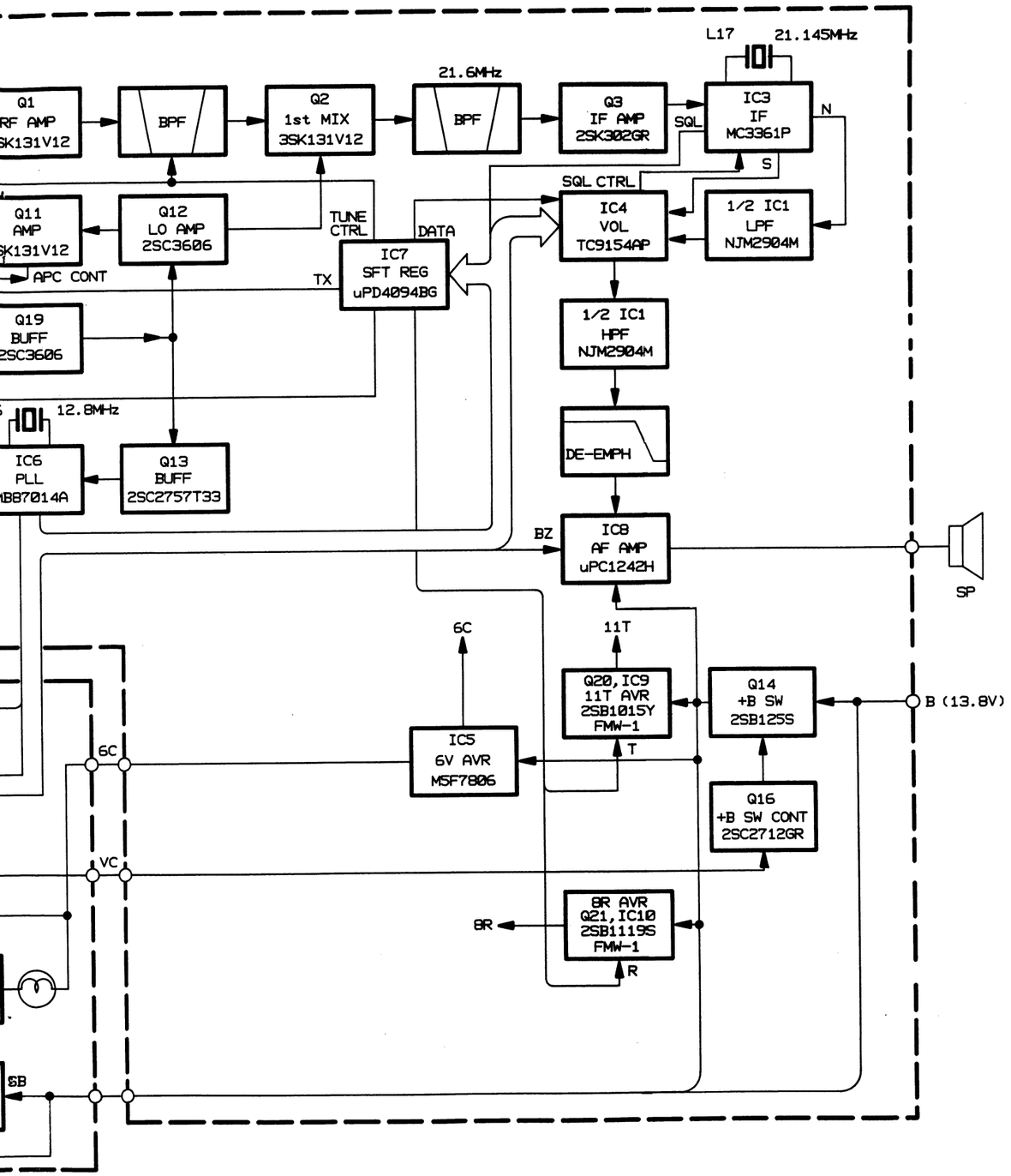


TKM-307 TK

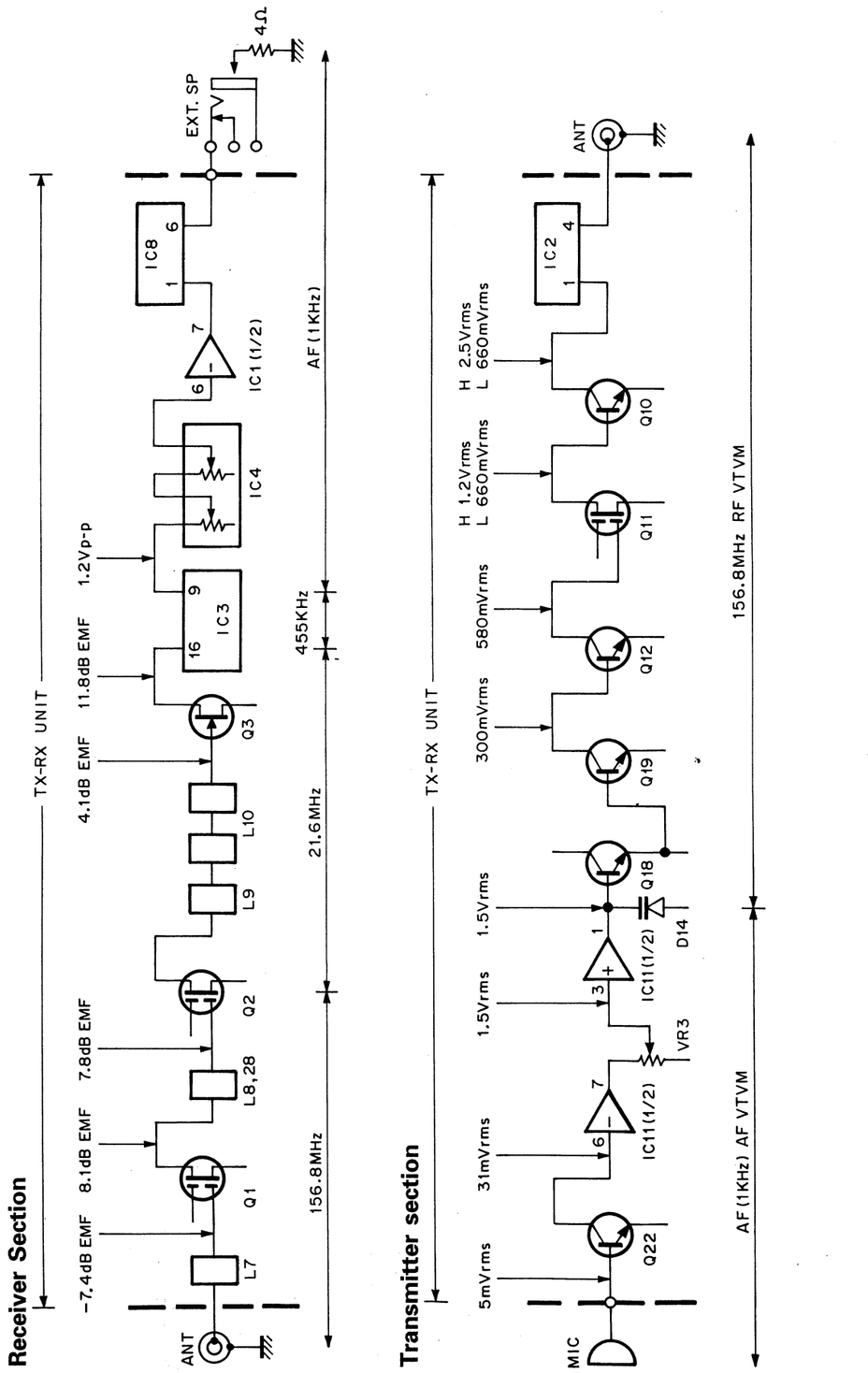
BLOCK DIAGRAM



DIAGRAM



LEVEL DIAGRAM



TKM-307

SPECIFICATIONS

GENERAL

Frequency Range	
Transmit mode	156 ~ 157.5MHz
Receive mode	156 ~ 163.0MHz
Mode	G3E (FM)
Power Supply Voltage	DC 13.8V ± 15%
Antenna Impedance	50Ω
Grounding	Negative
Frequency Stability	±10 PPM
Operating Temperature	–20 to +60°C
Dimension	W 152 x D 167 x H 52 (mm)
Weight	1.0kg

TRANSMITTER

Output power	
HI	25W
LOW	1W
Maximum Deviation	±5kHz
Modulation	Reactance
Audio Distortion (60% modulation)	Less than 3%
Spurious Radiation	
HI	Less than –70dB
LOW	Less than –56dB
Microphone Impedance	2kΩ
Power Consumption	
HI	Less than 6A
LOW	1.7A

RECEIVER

Conversion Type	Double conversion superheterodyne
Intermediate frequency	
1st	21.6MHz
2nd	455kHz
Sensitivity (12dB SINAD)	Less than 0.3μV
Selectivity	70dB/25kHz
Spurious Response	More than 70dB
Squelch Sensitivity	Less than 0.15μV
Audio Output Power (10% distortion)	4W
External Speaker Impedance	4Ω
Current Consumption	Less than 700mA

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